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VERMA (G. S.). **Wilt disease of Acacia melanoxylon R. Br.**—*J. Indian bot. Soc.*, 30, 1–4, pp. 14–27, 1 pl., 5 figs., 1 diag., 1951.

The examination of fungal isolates from different regions of diseased roots and shoots of six *Acacia melanoxylon* trees growing at a distance of 20 ft. from one another in the garden of the Botany Department, Lucknow University, indicated that wilting and death of the trees, occurring within four years, were due to *Fusarium caeruleum*, which was found on all the roots of four diseased trees. Sporophores of *Fomes lucidus* [*Ganoderma lucidum*: *R.A.M.*, 29, p. 591] were found at the base of the remaining two diseased trees. Other secondary organisms found on the diseased roots were a *Phomopsis* sp., an *Acrothecium* sp., and a dark non-sporulating fungus which was somewhat similar to the vegetative hyphae of *G. lucidum*. The last-named was restricted to the bark of the root, and was not present in the root at the early stages of the disease. Pathogenicity experiments showed that *F. caeruleum* could parasitize and kill three-month-old seedlings, while older seedlings were not susceptible.

FINDLAY (W. P. K.) & VERNON (J. W.). **A simple method for testing the toxicity of volatile antiseptics to wood-rotting fungi.**—*Ann. appl. Biol.*, 38, 4, pp. 876–880, 1 fig., 1951.

At the Forest Products Research Laboratory, Princes Risborough, a simple method was devised as a screening test to be used in the selection of volatile substances toxic to wood-rotting fungi [cf. *R.A.M.*, 13, p. 816; 19, p. 298]. The test fungi (*Lentinus lepideus*, *Fomes annosus*, *Polystictus versicolor* [ibid., 31, p. 263], and *Coniophora cerebella* [*C. puteana*: loc. cit.]) were cultured on 20 ml. of filtered malt agar medium in a thin layer at the bottom of 500-ml. conical flasks until the colony was about 3 cm. in diameter. The toxic chemicals (except water-soluble compounds) were dissolved in a highly volatile solvent of negligible toxicity (usually petrol), and 1 ml. of the solution was added in drops to a fluted filter-paper 15 cm. in diameter, which was allowed to hang freely in the air for not more than one minute to permit the solvent to evaporate. The folded filter-paper was then fixed in a hanging position in the flask by means of the closure cork, the inner surface of the latter in contact with the vapour being covered with metallic foil. If no further growth of the colony occurred after four days inoculum was transferred to fresh medium to determine whether the fungus had been killed or merely inhibited. Of the substances tested only dichlorpheno-oxymethylthiocyanate exceeded in effectiveness *p*-formaldehyde and thymol.

In further tests of effective substances blocks ($15 \times 5 \times 3{\cdot}5$ cm.) of spruce [ibid., 31, p. 414] were cut with the long axis at right angles to the grain, and a hole 1 cm. in diameter and 2 cm. deep was drilled in one face across the grain. Autoclaved blocks were inoculated with *Merulius lacrymans* or *Poria vaillantii*. After the fungus had grown through the block 1 or 2 ml. of the test substance were poured

into the hole, which was then plugged. Three days later small cores of wood were removed at distances of 2·5 and 5 cm. on each side from the edge of the central hole and incubated on malt agar. The results so far obtained indicate that the fumigation of partially decayed wood with materials toxic to wood-decaying fungi is likely to prove difficult, as penetration of gases across the grain is slow.

Pound (G. S.). **Relation of air temperature and virus concentration to mosaic resistance in Cabbage.**—*Phytopathology*, 42, 2, pp. 83–88, 2 figs., 1952.

At the Wisconsin Agricultural Experiment Station progenies of cabbage lines highly resistant to cabbage mosaic virus [*R.A.M.*, 31, p. 312] expressed this reaction in inoculation tests only at or below a temperature of 24° C. At 28° they developed severe symptoms. The results of assays to determine the concentration of the cabbage A component of the causal virus complex denoted a close correlation between symptom severity and virus concentration. Thus, at 16° and 20°, over which range resistance was extremely high, the virus concentrations were very low, whereas at 28° concentrations were proportionately high; at 24° the reactions were usually intermediate. Reversal of the air temperatures led to corresponding changes in symptoms and virus concentrations.

Agarwala (S. C.). **Relation of nitrogen supply to the molybdenum requirement of Cauliflower grown in sand culture.**—*Nature, Lond.*, 169, 4313, p. 1099, 1952.

In studies at Long Ashton Research Station, University of Bristol, Majestic cauliflower plants were grown in sand cultures with various levels of molybdenum and different sources of nitrogen supply. Nitrate gave the best growth at the normal molybdenum level, but the plants given the other treatments were sufficiently vigorous to demonstrate definite effects of molybdenum deficiency. The highest yields at a deficiency level of 0·00001 p.p.m. molybdenum were obtained with nitrite (no whiptail symptoms [*R.A.M.*, 31, p. 96]), ammonium sulphate plus calcium carbonate coming next. Whiptail symptoms were present at 0·00001 and 0·00005 p.p.m. molybdenum in all the other nitrogen treatments. Advanced stages of whiptail in large plants were characteristic of nitrate treatments and were accentuated by citric acid. A level of 0·00005 p.p.m. molybdenum prevented whiptail in the ammonium sulphate plus calcium carbonate treatment.

The effects of excess (50 p.p.m.) molybdenum also depended on the type of the nitrogen compound applied. With nitrate or ammonium nitrate, or ammonium sulphate plus calcium carbonate the toxic effect was small, but injury was acute with ammonium citrate, urea, or ammonium sulphate alone, the last inducing acute yellow interveinal chlorosis.

Hougas (R. W.), Rieman (G. H.), & Stokes (G. W.). **Resistance to white rust in Horseradish seedlings.**—*Phytopathology*, 42, 2, pp. 109–110, 1 fig., 1952.

Attempts are in progress at the Wisconsin Agricultural Experiment Station to develop resistance to the destructive white rust (*Albugo candida*) [*Cystopus candidus*] in horse-radish [*R.A.M.*, 20, p. 78] by hybridization of the commercially acceptable Common variety with strains of the resistant but less attractive Bohemian type. In greenhouse inoculation experiments on 169 Common × Bohemian hybrid seedlings, three classes of host-parasite reaction were established, namely, (*a*) resistance of the Bohemian type, characterized by a certain amount of sorus production and sporulation under optimum conditions; (*b*) resistance superior to the foregoing, with limited sorus development and no apparent sporulation; and (*c*) susceptibility exceeding that of the Bohemian strains and sometimes also of the Common. The distribution of the hybrid seedlings in classes (*a*), (*b*), and (*c*) was 4, 3, and 162, respectively, and the corresponding figures for 48 Bohemian selfs 9, 8, and 31, respectively.

Watson (Marion A.), Hull (R.), Blencowe (J. W.), & Hamlyn (Brenda M. G.). **The spread of Beet yellows and Beet mosaic viruses in the Sugar-Beet root crop. I. Field observations on the virus diseases of Sugar Beet and their vectors Myzus persicae Sulz. and Aphis fabae Koch.**—*Ann. appl. Biol.*, 38, 4, pp. 743–764, 4 graphs, 1 map, 1951.

A survey of aphids and virus diseases of sugar beet root crops in eastern England between 1940 and 1948 is summarized in detail. It showed that incidence of beet yellows virus [*R.A.M.*, 31, p. 217] increased with increasing numbers of *Myzus persicae*, counted on the plants and on sticky traps at intervals throughout the season, but not of *Aphis fabae* [ibid., 26, p. 520; 29, p. 247; 30, p. 449; 31, p. 159], suggesting that *M. persicae* may be the only important vector. Beet mosaic virus increased in the same manner, but as the association was not so complete the possibility of other vectors is not excluded [ibid., 25, p. 532; 27, p. 270; 28, p. 610].

Beet yellows virus was most prevalent in areas where seed crops are grown, but proximity to individual seed crops does not appear to increase incidence within such areas. *M. persicae* was more numerous on sugar beet in seed-crop areas than in others. Beet mosaic is more intimately associated with seed crops than is beet yellows and is most prevalent near them within seed-crop areas; the difference in the distribution of the two viruses is probably related to the difference in their persistence [ibid., 25, p. 245].

Fisher (H. H.). **New physiologic races of Bean rust (Uromyces phaseoli typica).**—*Plant Dis. Reptr*, 36, 3, pp. 103–105, 1952. [Multilithed.]

The reaction on the differential bean [*Phaseolus vulgaris*] varieties of ten new races (21 to 30) of bean rust (*Uromyces phaseoli* var. *typica*) [*U. appendiculatus*: *R.A.M.*, 20, p. 555; 27, p. 169 and cf. next abstract] collected from 1941 to 1951 in Colorado, Maryland, Montana, Nebraska, Oregon, and Wyoming is tabulated. For the identification of races 27, 28, 29, and 30, variety No. 181 was omitted and Golden Wax (G.G.) and Z4, a sister line of Topcrop and Rival, were added; in other respects the method of identification used was that of Harter and Zaumeyer [ibid., 20, p. 555]. Races 4 [ibid., 20, p. 43], 16, 18, and 20 are the only ones of the previously reported collection of 20 races that have been found again in the last decade. Of the new races reported, 25 was found six times, 21 and 27 three times each, 26, 28, and 30 twice each, and the remainder once each. Race 28, from Maryland, was identical with that described by Weaver and Marcus (*Plant Dis. Reptr*, 33, 12, pp. 483–484, 1949).

Cass Smith (W. P.), Harvey (H. L.), & Goss (Olga M.). **'Westralia'—a new rust resistant pole Bean.**—*J. Dep. Agric. W. Aust.*, Ser. 2, 28, 3, pp. 317–324, 4 figs., 1951.

The most serious disease affecting bean [*Phaseolus vulgaris*] crops yearly in Western Australia is rust (*Uromyces appendiculatus*) [*R.A.M.*, 22, p. 509; 31, p. 72, and cf. preceding abstract], which has spread to all commercial bean-growing localities. It may be present in any planting, generally becoming more severe towards the end of the season and often causing total failure in late crops of Golden Harvest. A resistant pole bean, Westralia, has now been developed from a natural cross between Golden Harvest and a resistant strain of Kentucky Wonder. It has the chief desirable qualities of both parents, is white-seeded, high yielding, and suitable as a 'fresh' bean or for canning.

Afanasiev (M. M.), Morris (H. E.), & Metcalf (H. N.). **Control of bacterial halo-blight disease of garden Beans in Montana.**—*Plant Dis. Reptr*, 36, 4, pp. 135–136, 1952. [Multilithed.]

Otherwise excellent crops of garden beans [*Phaseolus vulgaris*] in Montana are

frequently ruined by bacterial blight caused by *Pseudomonas* [*medicaginis* f. sp.] *phaseolicola* [*R.A.M.*, 31, pp. 219, 266, and next abstract]. During the 1951 growing season experiments on control were conducted at Bozeman, using blight-free Top Crop seeds raised in Idaho and infected seeds of an unknown variety, both lots being planted in soil which had grown no bean crop for several years. Plots of the former were sprayed with chemicals (at 250 gals. per acre) eight times at approximately weekly intervals from 23rd June to 17th August, guard rows of the latter being sprayed with a bacterial suspension on 23rd July. Blight appeared in these on 3rd August and in the experimental plots six days later. Disease readings were taken on the 16th and 27th. Bordeaux mixture (71 gm. of 4–4–50) gave complete control whereas fermate (5·3 gm.) was ineffective, the beans suffering to the same degree as the inoculated rows and more than the unsprayed. Sulphur (21 gm., 90 per cent. active ingredients) was only slightly effective. Bordeaux continued to give protection even after severe hail damage. There was no significant difference in yield between the different uninoculated plots.

Mitchell (J. W.), Zaumeyer (W. J.), & Andersen (W. P.). **Translocation of streptomycin in Bean plants and its effect on bacterial blights.**—*Science*, 115, 2979, pp. 114–115, 1952.

In studies at the Bureau of Plant Industry, Beltsville, Maryland, primary leaves of bean [*Phaseolus vulgaris*] inoculated with *Pseudomonas medicaginis* var. [f. sp.] *phaseolicola* [see preceding abstract] failed to develop symptoms of halo blight when a minute quantity of streptomycin sulphate was placed on the stems of the plants before inoculation [cf. *R.A.M.*, 31, p. 415]. Only very mild symptoms developed when dihydrostreptomycin sulphate was used in a like manner. In testing 12 antibiotics in this way, a 1 per cent. mixture of each was made by dissolving 12·5 mgm. of the compound in 0·25 gm. of tween 20 (a sorbitol derivative) and adding 1 gm. of melted lanolin. A small portion of the paste, containing approximately 0·2 mgm. of the antibiotic, was applied as a thin layer covering the internode immediately above the cotyledons of each of ten seedlings of the Black Valentine variety.

Comparable tests with the 12 materials on plants inoculated with *Xanthomonas phaseoli* [see next abstract; ibid., 31, p. 276] showed that dihydrostreptomycin sulphate and streptomycin sulphate were absorbed by the stems and translocated to the primary leaves of bean plants in quantities which prevented the production of symptoms of common blight without appreciably affecting plant growth. Terramycin hydrochloride [ibid., 31, p. 54] and aureomycin hydrochloride [loc. cit.] mitigated the symptoms but injured the plants and suppressed growth.

Streptomycin sulphate was translocated to leaves 6 to 8 in. from the site of treatment in amounts which reduced the incidence of infection and the severity of the symptoms produced by the halo blight organism.

Dimond (A. E.), Stoddard (E. M.), & Chapman (R. A.). **Chemotherapeutic investigations on the common bacterial blight of Beans.**—*Phytopathology*, 42, 2, pp. 72–76, 1952.

The method used at the Connecticut Agricultural Experiment Station for trials on the efficacy of a number of chemical compounds in the control of common bacterial blight (*Xanthomonas phaseoli*) in the highly susceptible Red Kidney bean [*Phaseolus vulgaris*: *R.A.M.*, 31, p. 219 and preceding abstract] involved stabbing the inoculum into the youngest node of young plants and watering them with solutions of the test preparation at maximum non-phytotoxic strength. After two to three weeks' incubation readings are made by grading individual leaves on plants, computing the mean grade per plot, and relating the resulting grade to

treatment. Among the more effective chemicals, judged by their capacity to reduce both the multiplication and pathogenicity of the bacteria, were 8-quinolinol salicylate, the dye auramine, benzoic acid, lauryl isoquinolinium bromide, zinc sulphate, and calcium chloride, but none was sufficiently potent to promise practical control of virulent strains of the pathogen. The treatments were more successful when solutions were absorbed through the roots than when injected into the stem. Their toxicity was also enhanced by application just after rather than before inoculation and by use for several consecutive days rather than for one or two days only.

AFANASIEV (M. M.) & MORRIS (H. E.). **Bean virus 2 (yellow) on Great Northern Bean in Montana.**—*Phytopathology*, 42, 2, pp. 101–104, 1952.

Bean [*Phaseolus vulgaris*] plants of the Great Northern variety, which is resistant to bean virus 1 [bean mosaic virus], are infected in Montana by a virus causing drooping of leaflets, chlorotic spotting, and later general mottling, distortion, and foliar crinkling; they gradually become dwarfed and spindly, grow slowly, flower late, and give poor yields. The virus is not transmissible through the seed.

Infection developed in the strains U.I. (University of Idaho) 15, U.I. 59, and Montana 1 of the Great Northern, and in Red Kidney, Ideal Market, and Pinto, also in broad bean, soy-bean, and white and yellow sweet clover (*Melilotus alba* and *M. officinalis*). Beans contracted infection from inoculation with sap of field-grown white and yellow sweet clover and Red Kidney bean plants. The sweet clovers apparently serve as the principal reservoir of the Great Northern bean virosis in nature. A measure of resistance to the disease was shown by two Great Northern selections, Montana 1 and Montana 43–15.

The virus was inactivated at a dilution exceeding 1 in 1,000, by ten minutes' heating at 60° C., and by over 18 hours' ageing.

The host differentiation, physical properties, and association of the virosis with *M. alba* and *M. officinalis* indicate that it is caused by bean yellow mosaic virus [*R.A.M.*, 28, p. 105; 31, pp. 218, 416].

BAWDEN (F. C.), CHAUDHURI (R. P.), & KASSANIS (B.). **Some properties of Broad-Bean mottle virus.**—*Ann. appl. Biol.*, 38, 4, pp. 774–784, 1 pl., 1951.

In July, 1947, more than three-quarters of the plants in a field crop of broad beans in Nottinghamshire developed mottling, necrosis, and crinkling of the leaves. Some plants were dwarfed, with few, if any, flowers, and symptoms were present on every leaf; of other plants only the young leaves were affected. The diseased plants frequently occurred in patches, the smallest being at the centre and severity of symptoms becoming progressively less marked towards the periphery. The disease, readily transmitted to broad bean, pea, sweet pea, bean (*Phaseolus vulgaris*), crimson, red, and subterranean clovers, and soy-bean by mechanical sap inoculation, was caused by a virus, which the authors propose to call broad-bean mottle virus.

On Prolific Big-Pod and Broad Windsor beans the first visible symptom was a clearing of the veins of the youngest leaves eight to ten days after inoculation; this then faded away and was replaced by a bright interveinal mottle. When first obtained from the field the virus also produced extensive necrosis in glasshouse plants; the leaves blackened at the margins and subsequently over the entire lamina, the main growing point and axillary shoots also succumbing. With repeated transfer under glass the culture appeared to lose virulence and after a year caused necrosis in winter only; later it produced only the mosaic symptoms in broad bean throughout the year.

The inoculated leaves of pea plants became necrotic and shrivelled in six to eight days and systemic infection induced wilt and collapse of the whole plant, the young

leaves sometimes displaying a faint mottle. Sweet peas were not killed but badly stunted, and the leaves were mottled and small.

In Canadian Wonder French beans the first obvious symptom was a bright yellowing along the veins of the youngest leaves about 12 days after the lower leaves were inoculated; this was followed by a bright interveinal mottle. Prince developed a transient mosaic of the younger leaves of some plants, but many behaved as symptomless carriers. Sap from systemically infected Canadian Wonder plants, diluted ten times with water, was infective to broad bean without the use of an abrasive, whereas sap from similar leaves of Prince was infective only when undiluted and used with carborundum. French bean varieties of both types often developed unusual local lesions; a month or so after inoculation, when systemic symptoms had already been present in such varieties as Canadian Wonder for a fortnight, discrete chlorotic spots, about 2 mm. in diameter, often appeared on the inoculated leaves and persisted until the leaves died.

Crimson, red, and subterranean clovers all became systemically infected and developed mosaic symptoms. Soy-bean developed only pin-point necrotic spots erratically on the inoculated leaves.

The thermal inactivation point of the virus was about 95° C., though sap became non-infective within three weeks at room temperature. The dilution end-point of broad bean sap was 1:1,000, only a little above the precipitation titre with specific antiserum. Precipitation with antiserum occurred over a smaller range of antigen-antibody ratios than with other viruses, and the virus was not precipitated with ammonium sulphate until 75 per cent. saturation was exceeded.

A specific nucleoprotein containing nucleic acid of the ribose type was isolated from infective broad bean sap in yields up to 2 gm. per l. Purified preparations made by salt precipitation and ultracentrifugation contained uniform spherical particles approximately 17 mμ in diameter. Much of this nucleoprotein appears to be non-infective, but in other respects it may resemble infective particles.

The virus is apparently not seed-transmitted, and tests with five different species of aphid and the bean weevil (*Sitonia lineatus*) were negative, though the pattern of field spread suggests an insect vector.

Hildebrand (A. A.). **Observations on spread in the soil of Cephalosporium gregatum Allington and Chamberlain, the cause of brown stem rot of Soy-beans.**—*Plant Dis. Reptr*, 36, 3, pp. 106–107, 1952. [Multilithed.]

In 1950 about a cubic yard of surface soil, taken from part of the old soy-bean disease garden of Harrow laboratory, Ontario, where, in 1949, brown stem rot (*Cephalosporium gregatum*) [*R.A.M.*, 29, p. 80; 31, p. 268] had been severe, was scattered over an area 45 by 20 ft. in one corner of a plot. In May the susceptible soy-bean varieties Capital, Harly, Harman, A. K. Harrow, Lincoln, and Adams were planted. In September the percentage of brown rot infection in the area to which infested soil was added was for each variety, respectively, 68·9, 80·6, 86·1, 98·7, 94·5, and 92·7, while in the remainder of the plot the corresponding figures were 2·4, 10·4, 12·5, 3·4, 4·3, and 1·1, showing that naturally infested soil is a very effective medium for the transfer of the disease. By September, 1951, the whole plot (about one-third of an acre), on which soy-beans had never been grown before, had become thoroughly infested, the fungus having spread in every direction from the original area into which it was introduced.

Jehle (R. A.), Jenkins (Anna E.), Kreitlow (K. W.), & Sherwin (Helen S.). **An outbreak of Phyllosticta canker and leaf spot of Soybeans in Maryland.**—*Plant Dis. Reptr*, 36, 4, pp. 155–158, 1 fig., 1 diag., 1952. [Multilithed.]

In late August and September, 1951, *Phyllosticta* stem and pod canker, as well as the leaf spot phase of the disease [*R.A.M.*, 31, p. 416], were abundant in soy-

bean plantings at Salisbury, Wicomico County, Maryland. The former phase was distinguished by small, superficial stem cankers measuring up to 4 mm. by 2 mm., grey to near-white, with narrow, purplish to brown borders, resembling those of scab disease [*Sphaceloma* sp.: *Plant Dis. Reptr*, 35, 2, pp. 110–111, 1951]. It was equally prevalent in two fields of Hawkeye, which had probably infected an adjoining field of Lincoln. The pathogen was identified as *P. sojaecola* [*R.A.M.*, 24, p. 218]. Greenhouse inoculations to Hawkeye at Beltsville resulted in leaf symptoms identical with those observed in the field. Reisolations were also made. Hitherto in the United States the disease has been reported to attack only the leaves.

SCHREUDER (J. C.). **Een onderzoek over de Amerikaanse vaatziekte van de Erwten in Nederland.** [A study on the American vascular disease of Peas in Holland.]—*Tijdschr. PlZiekt.*, 57, 6, pp. 175–206, 11 figs., 1951. [English summary.]

A full account is given of the author's exhaustive studies on 'pea sickness' in Holland, together with a survey of 42 contributions to the relevant literature and a discussion of the taxonomy of the *Fusarium* spp. involved, one of which, *F. oxysporum* f. *pisi* race 1 [*R.A.M.*, 29, p. 396], is responsible for the most serious of the maladies collectively known as 'foot and wilt diseases'. It has been observed with certainty in Holland since 1943 and was probably present before 1937. Other pea wilts of importance in the country are St. John's disease, caused by *F.o.* f. *pisi* race 3 and not to be confused with the frequently concurrent nematode infestation [ibid., 31, p. 98], and the foot rots due to *F. solani* f. *pisi*, *Mycosphaerella pinodes* [ibid., 28, p. 433], and *Botrytis cinerea*.

Discussing the nomenclature of the genus *Fusarium*, the author finds some justification for the objections raised in various quarters to the system of Wollenweber and Reinking [ibid., 14, p. 708], in which the subtle mycological criteria used lead to the differentiation of a multiplicity of forms without phytopathological significance. For the pea pathogens of the sections *Elegans* and *Martiella*, therefore, Snyder and Hansen's method of classification [ibid., 19, p. 495; 21, p. 223] has been adopted. On the other hand, the old names are retained for the readily distinguishable fungi of the sections *Discolor* and *Roseum* [ibid., 25, p. 366], represented by *F. culmorum*, *F. flocciferum*, and *F. avenaceum*, the pathogenicity of which in relation to the pea has not yet been fully investigated.

The results of the pot and field experiments herein described did not differ materially from those obtained by Linford in Wisconsin [ibid., 8, p. 214; 11, p. 86]. In soil already infested for some time the symptoms usually appear in the third week of May, and by mid-June the plants have withered without forming pods. This rapid development of the disease frequently culminates in total failure of the crop. In greenhouse experiments with a pure culture of the *Fusarium* isolated from an infected plant, using contaminated soil sterilized with formalin and uninfested soil, the fungus was definitely shown to be responsible for the disease. Mycological methods alone did not suffice for its identification with *F.o.* f. *pisi* race 1; it was also necessary to take into consideration the similarity in the behaviour of the fungus towards American and Dutch pea varieties and the agreement in the resultant pathological symptoms.

In field plot disinfection experiments with formalin and carbon disulphide, the activity of the former was hindered by its inability to penetrate easily into the clay soil, while the latter was useless for the object in view. The inoculation of plants growing in soil, sand, and cork dust was uniformly successful.

The following are the total numbers of fungi isolated from 291 plants in infested field and pot soils in 1943–4 and from 1946 to 1950: *F.o.* f. *pisi* race 1, 122, *F.* spp. 140, *Ascochyta pinodella* [ibid., 28, p. 43] 70, *Botrytis cinerea* 15, and *Pythium* spp. 9.

Clear-cut differences in susceptibility and resistance to 'pea sickness' were observed. Thus, all the ordinary round blue field peas are susceptible, while marrowfats, short-straw grey, and short-straw maple are resistant, as are also a number of American canning varieties [cf. ibid., 10, p. 576; 29, p. 191]. The reactions of the long-straw grey and maple are variable.

KEENER (P. D.). **Virus diseases and interesting virus-like symptoms in Melons in Arizona—1950–1951.**—*Plant Dis. Reptr*, 36, 4, pp. 128–131, 4 figs., 1952. [Multilithed.]

From 1947 to 1949 the percentage of honey-dew melons in Arizona affected by virus-induced mosaic [*R.A.M.*, 28, p. 206; 31, pp. 166, 368] in the field was very high and in 1951 100 per cent. of the plants in many fields were affected and much fruit damage occurred. In tests in 1951 at Tucson the percentage of seed-borne mosaic in cantaloupe and honey-dew seedlings from commercial seed lots grown under caged conditions was 0·6 and 3·4, respectively, in the greenhouse, and 0·6 and 1·6 in the field. Two weeks prior to harvest the percentage of infected plants adjoining carrots and lucerne averaged 48 compared with 23 per cent. near highways where most of the weeds had been eliminated. Imperial 45 cantaloupes adjacent to sugar beets showed an average of 45 per cent. mosaic, while near by a 40-acre stand beside non-developed land comparatively free from weeds bore an average of 2 per cent. infection.

One virus involved was readily transmitted by the sap-carborundum method as well as by the pea aphid, *Macrosiphum pisi*, to squash, cantaloupe, and honey-dew seedlings. A virus occurring in the seeds of squash (14 per cent.) available to growers on the market also infected cantaloupe and honey-dew seedlings.

WILES (A. B.) & WALKER (J. C.). **Epidemiology and control of angular leaf spot of Cucumber.**—*Phytopathology*, 42, 2, pp. 105–108, 1952.

Continuing their studies at the University of Wisconsin, Madison, on angular leaf spot of cucumber (*Pseudomonas lacrymans*) [*R.A.M.*, 31, p. 273], the authors found that cotyledonary lesions, which are the source of primary inoculum in the State, develop on the germination of infected seed [ibid., 1, p. 327]. None of the seed treatments tested (10, 20, or 40 minutes in mercuric chloride at 1 in 1,000 arasan dust, and 30 minutes in water heated to 50° C.) eradicated the pathogen from naturally infected seed or reduced the percentage of diseased seedlings by more than half. From comparatively few infected plants (less than 10 per cent.) scattered through a field the organism may increase to epidemic proportions by continual dissemination [ibid., 10, p. 287].

In the greenhouse environmental conditions after inoculation were important in determining the incidence of disease, which increased as the air and soil temperatures rose up to 28°. The optimum temperatures for host development (air 20° to 24°, soil 24°) were also favourable to disease development. Humidity, however, appears to be the decisive factor, no macroscopic symptoms having been observed in these investigations without some form of post-inoculation moisture treatment. The small lesions formed after four hours in the moist chamber expanded with lengthening periods up to 96 hours; no symptoms appeared on plants incubated for two hours only. When the moisture content of the plants was increased before inoculation by means of watersoaking, water congestion, or in moist chambers and under bell jars, infection occurred sooner and was accompanied by more severe symptoms. In one series of tests in which soil and air temperatures were maintained at 32° and 22°, respectively, the plants were rapidly destroyed. At soil temperatures of 24° and 28° and air at 22° the effects of the disease were milder.

Water congestion strongly influenced the rate and extent of field epiphytotics of angular leaf spot in Wisconsin in 1948, 1949, and 1950. Warm days, followed

by an extreme fall in temperature during the night, seemed to promote the disease most effectively once primary infection centres were established. Such conditions provided not only the night dews that facilitate penetration, but high rates of water absorption in warm soil.

Pending improvements in eradication by seed treatment it might be advisable to transfer the cultivation of cucumbers for seed production to areas where seed contamination and infection are precluded by climatic conditions.

McKeen (C. D.). **Investigations of Fusarium wilt of Muskmelons and Watermelons in southwestern Ontario.**—*Sci. Agric.*, 31, 10, pp. 413–423, 2 pl., 3 graphs, 1951.

Survey records of *Fusarium* wilt (*F. oxysporum* f. *niveum*) [*F. bulbigenum* var. *niveum*: *R.A.M.*, 26, p. 8; 30, p. 453; 31, p. 418] of muskmelons and watermelons have shown crop losses amounting to 75 per cent. on several farms in the chief melon-growing areas of Essex county in south-western Ontario, where the disease has become very widespread within the last decade owing to build-up in the soil. In greenhouse tests six isolates from muskmelon, all morphologically and pathogenically alike, were found to be capable of attacking watermelon seedlings, while three isolates from watermelon, differing sufficiently in virulence on watermelon seedlings to be regarded as different physiologic strains, were capable of causing wilt of muskmelon seedlings. The virulence of any isolate was greater on its original than on the other host. Seed treatment with thiram provided protection against pre-emergence rot.

Du Plessis (S. J.). **Three important Vine diseases with particular reference to bacterial blight, and facts about vineyards and Vine nurseries in South Africa.**—*Sci. Bull. Dep. Agric. S. Afr.* 323, 30 pp., 4 pl. (3 col.), [? 1951].

The chief symptoms of bacterial blight (*Erwinia vitivora*) [*R.A.M.*, 20, p. 44; 30, p. 559], anthracnose (*Gloeosporium ampelophagum*) [*Elsinoe ampelina*: ibid., 19, p. 454; 28, p. 49], and dead arm (*Phomopsis* [*Cryptosporella*] *viticola*) [ibid., 18, p. 231; 28, p. 511], affecting vines in South Africa, are described. The lenticular, stripe-like spots on green shoots, petioles, and bunch stalks and the stripe-like leaf spots are considered to be some of the most characteristic symptoms of dead arm. In South Africa dormant treatments applied as late as possible before growth commences give the most effective control of dead arm as they check primary infections. Although the conidia develop readily in culture they rarely occur under natural conditions and have been observed only on dead, infected wood in pustular black pycnidia.

Information obtained during a visit to Europe in 1949 [ibid., 30, p. 303] indicated that a disease corresponding to *E. vitivora* is present in Spain but is extremely rare; in Italy it still occurs occasionally as a form of 'mal nero' [ibid., 29, p. 347], and in Switzerland appears as a rare bacterial spot on the leaves [ibid., 24, p. 175], probably corresponding to the leaf spot phase of blight.

Many of the popular vines are relatively susceptible to the most important diseases in South Africa.

Briza (K.). **Rezultati ispitivanja mogućnosti primene aviona u borbi protiv plamenjače na Vinovoj Lozi u 1950 god.** [Results of investigations on the possibility of using aeroplanes for controlling downy mildew in vineyards in 1950.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1951*, 6–7, pp. 105–118, 4 pl., 1951. [English summary.]

In 1950 an aerial spray trial was carried out against vine downy mildew (*Plasmopara viticola*) [*R.A.M.*, 30, p. 12 and next abstract] in the large Sonja Marinković vineyard, Vršac, Yugoslavia. A 1 Stearman PT–17 aeroplane carrying 120 l. of Bordeaux mixture was used. The mixture was conveyed through rubber pipes

to three jets attached under the wings and, with the help of air-driven propellors in the jets, spray was dispersed on the vines from a height of 2 to 10 m., the average speed of the aeroplane being 170 km. per hour. The plot was sprayed in strips 12 m. wide.

Control of downy mildew was found to be possible by aerial spraying. The amount of copper residue on the leaves was two to seven times smaller than that resulting from hand spraying but varied with the weather conditions; control was best when leaves were wet and relative humidity was high. While waste of the fungicide was greatly increased, total expenses were reduced by about 52·6 per cent.

Jordović (M.). Авио-прскање Винове Лозе против пламењаче у 1951 години. [Aero-spraying of Grape Vines against downy mildew in 1951.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1951*, 6–7, pp. 119–125, 1951. [English summary.]

In the 1951 aerial spray trials for the control of vine downy mildew [*Plasmopara viticola*: see preceding abstract] on several vineyards in the plains of Yugoslavia two PT–17 aeroplanes, each with four spray jets, and one single-engined Junkers with 10 jets were used. Five per cent. Bordeaux mixture was applied at 350 to 500 l. per ha.

The results on young, short vines were satisfactory but aerial treatment of fully grown ones should be supplemented with hand sprays. The season was extremely favourable for the development of downy mildew, and leaf infection after spraying, which was carried out too late, varied from 5 to 30 per cent. in some vineyards.

Yarwood (C. E.). **The phosphate effect in plant virus inoculations.**—*Phytopathology*, 42, 3, pp. 137–143, 1 fig., 3 graphs, 1952.

In inoculation experiments at the University of California, Berkeley, using Takahashi's adaptation [*R.A.M.*, 27, p. 162] of the carborundum dusting method, the addition of 1 per cent. dipotassium phosphate to infective sap containing the viruses of tobacco mosaic, tobacco ring spot, tobacco necrosis, lucerne mosaic, white clover mosaic [pea wilt plus pea mottle viruses: ibid., 31, p. 317], broad bean mosaic, cucumber mosaic, pea mosaic, and cabbage black ring [ibid., 30, pp. 305, 557] increased the number of lesions formed on bean (*Phaseolus vulgaris*) leaves [cf. ibid., 15, p. 177]. On other hosts of the same or different viruses the effect of the chemical was much less pronounced or altogether absent.

On Pinto bean the ratios of the number of lesions formed with inoculum alone to the number resulting from the addition of phosphate, to carborundum alone, and to both carborundum and phosphate were 1:20:65:2,860, respectively, the ratios of the amounts of inoculum to produce one lesion per leaf under these conditions being approximately 100,000:1,000:100:1.

The addition of phosphate to tobacco mosaic virus inoculum reduced the incidence of infection on the lower leaves of *Nicotiana glutinosa* but increased it on the upper ones. With inoculum alone more tobacco mosaic virus lesions were produced per unit area of leaf on *N. glutinosa* than on bean, but with phosphate nine times as many lesions developed on bean as on *N. glutinosa*. In comparative tests on potted plants and on detached leaves floated on water or 8 per cent. sucrose solution [ibid., 31, p. 317] the tobacco mosaic virus lesions were much larger on the leaves on water than on greenhouse plants but much smaller on those on sucrose. One minute's immersion of bean leaves in 1 per cent. dipotassium phosphate at 45° C. greatly enhanced their susceptibility to tobacco mosaic virus, while a similar but weaker effect was exerted by hot water.

The immediate washing with water of bean leaves inoculated with an aqueous suspension of tobacco mosaic virus failed to reduce the number of lesions as compared with unwashed bean leaves, but when leaves inoculated with a phosphate

plus virus suspension were washed immediately after treatment they contracted much less infection than when washing was delayed for 30 minutes. The application of carborundum with a dry brush was much more effective than with a wet one [loc. cit.] in augmenting the incidence of infection on bean leaves by a tobacco mosaic virus plus phosphate suspension.

The enhancement of virus infection by the admixture of dipotassium phosphate with the inoculum appears to be due to an increase of host susceptibility rather than to an intensification in virus infectivity, the effect being through the chemical action of the compound in increasing the size, number, and permeability of the perforations in the cells originating from the abrasion of the leaf surface in inoculation.

MARAMOROSCH (K.). **Direct evidence for the multiplication of Aster-yellows virus in its insect vector.**—*Phytopathology*, 42, 2, pp. 59–64, 3 figs., 1 diag., 1952.

In further work at the Rockefeller Institute for Medical Research, New York, the aster yellows virus was carried in the vector *Macrosteles divisus* through 10 serial passages [*R.A.M.*, 31, p. 221]. Some members of all but the third and fifth groups were found to be infective, thereby providing direct evidence for the multiplication of the virus in its vector. The estimated dilution for the inoculation of the tenth group of the series, had no multiplication occurred, would have been 10^{-40}, but the dilution end point of the virus from macerated insects was shown to be below 10^{-4}. No decrease in virus concentration could be detected between the inocula of the first and the ninth passages. From these results it appears that the aster yellows virus, multiplying in both its plant and insect hosts, is an animal as well as a plant virus.

HOPKINS (J. C. F.). **Summary of Annual Report for the Branch of Botany and Plant Pathology for the year ended 30th September, 1950.**—*Rhod. agric. J.*, 48, 5, pp. 454–459, 1951.

In this report on plant disease work in Southern Rhodesia in 1949–50 [cf. *R.A.M.*, 30, p. 511] new records include onion damping-off (*Phytophthora parasitica*), rice blast (*Piricularia oryzae*) [C.M.I. map No. 51], lucerne downy mildew (*Peronospora trifoliorum*) [cf. *R.A.M.*, 2, p. 54; 17, p. 44], and leaf blight of pea (*Septoria pisi*) [cf. ibid., 26, p. 1; 30, p. 400; 31, p. 3].

A tobacco spot necrosis was caused by phosphorus deficiency [cf. ibid., 26, p. 219; 28, p. 424; 29, pp. 61, 233]. A serious outbreak of tobacco leaf curl [virus: ibid., 19, p. 197; 21, p. 167; 30, pp. 24, 79] on new farms north of Macheke was traced to ratoon tobacco on adjacent old farms. Tomato streak, observed for the first time, was due to a strain of tobacco mosaic virus [cf. ibid., 22, p. 280; 28, p. 210]. Peppermint wilt (*Verticillium dahliae*) [cf. ibid., 31, p. 351] may have been imported in cuttings; tips of apparently healthy shoots from diseased plants gave rise to a high proportion of affected plants. Good control of bitter rot [*Glomerella cingulata:* ibid., 28, p. 210] in White Winter Pearmain apples was obtained with 2–2–50 Bordeaux mixture, which also reduced storage break-down. Potato wilt in the Eastern Districts was due to an atypical strain of *Pseudomonas solanacearum* [loc. cit.], which does not blacken steamed potato plugs. It is closely related to the potato and tomato strains found elsewhere in the Colony, but is distinct from the tobacco strain [ibid., 29, p. 144]. Another indigenous host of the potato strain, found at Bikita, was a *Solanum* near *panduraeforme*. Control of sugar-cane smut [*Ustilago scitaminea*: ibid., 30, p. 512] by removal of the smut whips was satisfactory on varieties which were not highly susceptible.

Serious diseases of sunn hemp [*Crotalaria juncea*] are black root rot (*Thielaviopsis basicola*) [ibid., 30, p. 511], and lodging associated with *Macrophomina phaseoli* [cf. ibid., 24, p. 503] and with *Colletotrichum curvatum* [cf. ibid., 17, p. 41]. In pot

trials tobacco grown in soil infested with *T. basicola* was not affected, while sunn hemp readily succumbed to the disease. Of various crop plants grown in infested soil in the field only cowpeas became diseased.

Deighton (F. C.). **Plant pathology section.**—*Rep. Dep. Agric. S. Leone, 1949*, pp. 14–16, 1951. [Received April, 1952.]

In this report [cf. *R.A.M.*, 29, p. 144] it is stated that teleutospores of *Uromyces vignae* [ibid., 29, p. 333; 31, p. 72] were observed for the first time in Sierra Leone on a native variety of cowpea at Bo. The common and very similar rust attacking *Vigna venulosa* [ibid., 28, p. 620], previously thought to be *U. vignae*, is now attributed to *U. pazschkeanus*.

The rice disease caused by *Ephelis pallida* [loc. cit.] attacked the varieties Kavunginpoothala and PTB.15 at Rokupr in 1948. Atebubu (seed from Rokupr) was attacked in 1949, while Fortuno, Sagbama, Konko, and Atebubu, also from Rokupr seed grown on small upland plots at Njala, remained free from infection. The fungus occurred in its *Balansia* state on *Panicum laxum* (a new host record) at Njala, and commonly on *P. dinklagei* elsewhere.

Onion bulbs at Newton Agricultural Station were attacked by *Botryodiplodia theobromae*. In a moist chamber they rapidly became covered from the neck downwards by *Aspergillus niger* [ibid., 30, p. 113].

New records include *Isariopsis griseola* on *Phaseolus vulgaris* leaves [ibid., 31, p. 3] at Njala, *Puccinia cynodontis* on *Cynodon dactylon* [ibid., 29, p. 497], and *A. melleus* [ibid., 8, p. 20] on locally made cheroots from Makeni.

Enige ziekten en plagen in cultuurgewassen in 1950 en hun bestrijding. [Some diseases and pests of cultivated crops in 1950 and their control.]—*Versl. PlZiekt. Dienst Wageningen* 118, 120 pp., 33 figs., 3 graphs, 1951.

The following are among the many records of interest in this report from the Dutch Phytopathological Service for 1950 [cf. *R.A.M.*, 29, p. 494]. Foot rot of wheat, especially the Alba and Staring varieties, was more prevalent than in former years, *Ophiobolus graminis* being chiefly responsible. Severe outbreaks of maize smut (*Ustilago zeae*) [*U. maydis*] occurred in eastern Brabant, Limburg, and Utrecht, particularly where crop rotation was not practised. Maize was also attacked by *Gibberella saubinetii* [*G. zeae*]. The omission of seed treatment may result in loss of seedlings.

Clover pathogens included the foliicolous *Sphaerulina trifolii* [ibid., 13, p. 520], which may be very injurious to white clover, especially in monoculture, and *Sclerotinia trifoliorum* [ibid., 13, p. 519], the latter being prevalent and severe in areas of intensive cultivation. *Verticillium albo-atrum* was isolated from the discoloured vascular tissues of a third-year lucerne stand [cf. ibid., 27, p. 410] on one of the southern islands. A sample of pasture grass was found to be infected by *Corticium fuciforme* [cf. ibid., 31, p. 330], first observed in Holland in 1949. Also parasitic on turf were *Phyllachora* (?) *graminis* [loc. cit.] and *Helminthosporium siccans* [*Pyrenophora lolii*], the latter affecting English and Italian rye grass [*Lolium perenne* and *L. multiflorum*: loc. cit.].

Weather conditions were highly conducive to potato blight (*Phytophthora infestans*) [ibid., 31, p. 26]. In the 17 field spraying trials distributed throughout the country Bordeaux mixture with a copper-lime ratio of 3:2 gave the best control of storage rot, while copper oxychloride and copper oxide were superior to dithane Z78 as protectants against severe leaf infection; the last-named, however, is adequate in milder cases and its efficiency may be increased by raising the quantity for the first treatment from 1·5 to 3 kg. per 1,000 l. and using 5 instead of 2·5 kg. for the following applications. In a large-scale test to determine the comparative efficacy of spraying (1,000 l. water per ha.) and mist application

(100 l. with an Urgent apparatus), using the same quantities of fungicide, copper oxychloride, copper oxide, and dithane Z78 gave similar results by both methods.

The adequacy of the so-called 'quarantine' for early potatoes intended for export, i.e., a storage period permitting the development of latent infection by *P. infestans* with consequent facilitation of grading, was examined by experiment. Bintje and Eigenheimer tubers, not fully ripened and mostly obtained from diseased crops on clay soil sprayed with a copper fungicide, were stored in (*a*) boxes in a barn and (*b*) clamps. The 12-day period fixed by the Phytopathological Service was found to be insufficient for either storage method; a fortnight was adequate for the boxes, but even after 20 days new infections developed in clamps. No definite conclusions can be drawn from these tests, since the blight outbreaks of 1950 were abnormally severe and only two varieties were used. It is clear, however, that material from infected crops on damp soil should be stored under dry conditions for at least 14 days.

Colletotrichum atramentarium [ibid., 31, p. 81], a rarity in Holland [ibid., 11, p. 767], was isolated from a surprisingly large number of potato tuber samples.

All kinds of crucifers sustained very severe infection by *Alternaria brassicae* [loc. cit.], which caused heavy reductions in yield. The control of the fungus is a problem of annual recurrence that urgently demands investigation, especially in connexion with seed production. *Sclerotium cepivorum* was responsible for extensive damage to field onions.

Twelve spray warnings for apple and pear scab (*Venturia inaequalis* [ibid., 31, p. 286] and *V. pirina* [ibid., 29, p. 140; 31, p. 189]) were issued between 24th March and 1st June. The critical periods were found by subsequent enquiry immediately to precede the discharges of 24th to 28th April and 6th to 8th May. Propaganda stressing the value of pre-blossom treatments has been generally successful, three or even four sprays having been given in some orchards. In field experiments to determine the relative efficiency of various pre-blossom schedules the best results were given by two or three applications of copper oxychloride at 0·75, 0·5, and 0·25 per cent. The combinations of 0·75 per cent. copper oxychloride, 2 per cent. lime-sulphur, and 1·5 per cent. lime-sulphur, with the mercurial aaventa [ibid., 31, p. 287] at 0·2, 0·15, and 0·1 per cent. were of practically equal value in scab prevention. Three pre-blossom treatments with the mercury-containing venturicide or aaturia (both at 0·2 per cent.) were about as effective as aaventa at the prescribed concentrations. Used at a strength of 0·25 per cent. the liquid mercurial, alvesco (Murphy), proved satisfactory as a second pre-blossom spray (following copper oxychloride) and for post-blossom applications, the first at 0·2 and later at 0·125 per cent. Among the new anti-scab preparations tested TP13 [ibid., 31, p. 26] was outstanding at pre- and post-blossom concentrations of 0·75 and 0·5 per cent., respectively. Other apple pathogens included *Phacidiella discolor* [ibid., 31, p. 244] and *Phomopsis mali* [*Diaporthe perniciosa*: cf. ibid., 11, p. 767], while pear trees sustained damage from *Verticillium dahliae*, *Gymnosporangium sabinae*, and stony pit [virus], which was observed on the Précoce de Trévoux variety besides the commonly affected Clapp's Favourite and Maagdepeer.

The walnut leaf spot caused by *Gnomonia leptostyla* seems to flourish on damp soils with a high lime content. The conidia develop on the large, greyish-brown leaf lesions and the perithecia on the fallen leaves [ibid., 28, p. 315], which should be thoroughly cleared away. Diseased material should be cut from the trees and a copper fungicide applied. Other walnut pathogens encountered included *Xanthomonas juglandis* [C.M.I. map No. 133].

American gooseberry mildew (*Sphaerotheca mors-uvae*) [*R.A.M.*, 29, p. 176] appears to be greatly on the increase, many consignments intended for export to England having been rejected on this account of recent years. The virulence of *Puccinia pringsheimiana* [C.M.I. map No. 209] is increasing annually, while delay

in spraying resulted in heavy damage by *Pseudopeziza ribis* [*R.A.M.*, 29, p. 141].

A few cases of raspberry wilt (*V. dahliae*) [ibid., 12, p. 705; cf. 31, p. 337] were observed, but there were no blue stripes on the canes, such as are associated with the disease in England [ibid., 15, p. 817; 29, p. 333]. Other hosts of the fungus in Holland include *Ampelopsis*, Japanese *Acer* [*A. japonicum*], *Cotinus*, *Photinia villosa*, *Rhus typhina*, and ash.

Observations were made in two localities on the development and spread of asparagus rust (*Puccinia asparagi*) [C.M.I. map No. 216] in relation to weather conditions with a view to establishing a basis for control measures. The critical phases in the life-cycle of the pathogen were approximately parallel in both areas, aecidial maturity falling within the period from 1st to 9th June, inception of the uredosori about mid-June, onset of teleutospore production the first to second week in July, and rust in all fields by the 25th. In one place the disease spread widely from 4th to 15th August and the foliage died off between 2nd and 14th September. Good control was secured by five applications of 0·2 per cent. dithane Z78 with a spreader (1 in 3,000), seven to eight treatments giving even better results.

In many districts nearly all *Brassica* varieties, especially Brussels sprouts were attacked by *Phoma lingam* [*R.A.M.*, 16, p. 438]. The plants collapsed suddenly, exposing a largely decayed root system. Stands raised from both treated and untreated seed were affected.

In shallot plots each 50 sq. m., sprayed four times against downy mildew (*Peronospora schleideni*) [*P. destructor*: C.M.I. map No. 76] with 0·75 per cent. dithane D14 plus zinc sulphate, lime, and 0·5 per cent. agral spreader, 0·25 per cent. aafertis plus 0·15 per cent. agral, and 0·2 per cent. dithane D78 plus 0·5 per cent. agral, using 4 l. of each per treatment, the last-named resulted in yield of 101·7 kg., as compared with 82·7, 80·3, and 75·5 for dithane D14, aafertis, and untreated, respectively.

Decay of the basal portions of garlic bulb scales was found to be due to *F. culmorum*, which impaired the keeping properties of the affected lots.

Helicobasidium purpureum attacked *Levisticum officinale* plants cultivated on a plot of ploughed-up grassland.

Young *Acer* branches killed by *Nectria cinnabarina* [*R.A.M.*, 25, p. 87] bore the black fructifications of a secondary invader, *Steganosporium piriforme*.

The probably non-parasitic *Pithya cupressi* [ibid., 23, p. 6] was observed to be fruiting abundantly on twigs of *Juniperus sabina*. *J. communis* may sustain severe branch malformation due to *Gymnosporangium clavariiforme* [ibid., 20, p. 330].

Physalospora miyabeana was again very prevalent on *Salix* [ibid., 28, p. 94], all species of which are more or less susceptible, *S. alba* and *S. purpurea* being specially prone to infection. The pathogen may be combated by the exclusive use of healthy planting material, proper drainage, and repeated spraying with Bordeaux mixture if necessary.

The observations on *Dahlia* viroses initiated in 1948 were continued. Among 600 plants of 98 varieties known or suspected to be diseased, over 78 per cent. showed symptoms of *Dahlia* virus 1 [*Dahlia* mosaic virus: ibid., 31, p. 123] and only 2 per cent. those of *Lycopersicum* virus 3 [tomato spotted wilt virus], the former appearing late in the season (September to October) and the latter early (up to September). As in previous years, the diseased plants produced fewer blooms than the healthy, and in severe cases flowering was suppressed altogether. Floral discoloration was noted in the Troef, Rosa Bird, and Vivianna Coppens varieties. In general, the *Dahlia* viroses are more in evidence during overcast periods than in sunny weather. Tests have demonstrated the improbability of virus transmission over distances exceeding 40 m.

Effective control of *Septoria phlogis* on *Phlox drummondii* [cf. ibid., 17, p. 654] was obtained by spraying with 1 per cent. copper oxychloride, a minimum of three

applications being essential. In mid-September the treated plot was still in full bloom, with bright green new foliage, whereas on the unsprayed flowering was finished and many plants were infected. The seed yields from the two plots were 1,392 and 871 gm., respectively.

Sphaerotheca humuli on pansies grown for seed was almost completely eliminated by spraying with 0·5 per cent. spersul.

The results of field experiments in seed disinfection and protection are summarized. In eight Carsten V wheat stands the average number of ears per 10 sq. m. developing bunt (*Tilletia tritici*) [*T. caries*: ibid., 31, p. 26] following inoculation of the seed was reduced by treatment with standaard 1 and standaard 2 from 375 to 0·3 and 0·1, respectively. Attempts are in progress in the south-west, where the disease assumes a virulent form, to reduce the number of infected plants by seed disinfection to one per are, in conformity with the latest official requirements, which formerly permitted five. An indication of differences in varietal reaction to *T. caries* was given by the percentages of infected ears (average of three fields) in untreated Juliana, Alba, Staring, and Carsten V, which were 74, 71, 44, and 35, respectively.

Thiram-containing plant-protectives [ibid., 31, p. 392] proved more suitable than mercurials for the prevention of damping-off in maize, peas [ibid., 31, p. 391], and beans [*Phaseolus vulgaris*], the last two also responding favourably to phygon and spergon.

In field trials the best control of apple mildew (*Podosphaera leucotricha*) was obtained with three or four pre-floral applications of the wettable sulphur thiovit [ibid., 29, p. 455] at 1 to 1·5 per cent. for the first and 0·5 per cent. subsequently. At 0·5 per cent. it was also used for the combined post-floral treatment of mildew and scab [ibid., 28, p. 461]. Cupremuls, a copper-containing oil emulsion, gave excellent control of rose mildew (*Sphaerotheca pannosa*) in outdoor plantings. Tomato leaf mould (*Cladosporium fulvum*) can be effectively combated by shirlan [ibid., 24, pp. 6, 343] and by the dusts cladox, lirospora, and bulbosit only when the applications are made before the onset of infection. *Corynespora melonis* [*C. cassiicola*: ibid., 7, p. 6] on cucumber is readily controllable by spraying with organic mercurials, such as aardisan [ibid., 28, p. 415] or aretan [loc. cit. *et passim*], but greater difficulty was experienced in combating the severe attacks of *Cladosporium cucumerinum* which occurred in 1950. The highly efficient bulbosan dust [ibid., 26, p. 375; 31, p. 26] is no longer on the market, and the various substitutes tested, e.g., dithane Z-78 and lirovurex were of only moderate efficacy. Liroferm speciaal (Firma Ligtermoet), one of the ferbam [ibid., 29, p. 221 *et passim*] group, and TP13 gave excellent control of tulip 'fire' (*Botrytis tulipae*) [ibid., 25, p. 115]. Together with two other ferbam preparations, aafertis and trifungol [ibid., 30, p. 631], liroferm speciaal appears to be of equal efficacy with fermate in the control of the disease, while the zinc carbamates zerlate and triscabol [loc. cit.] are comparable with the iron carbamates for the same purpose. Root decline of hyacinth (*F. culmorum*) [ibid., 11, p. 460] was reasonably well controlled, though not entirely eliminated, by soil applications of formalin at a dosage of 3 l. in 30 l. water per bed of 10 sq. m., and comparable results were obtained by dusting the bulbs with aaforma at the rate of 10 gm. per kg. Soil treatment with the pentachloronitrobenzene-containing compounds brassicol [ibid., 30, p. 430] and aafuma [ibid., 31, p. 26] at 70 gm. per sq. m. is the best and safest means of combating *Sclerotium tuliparum* on tulip [ibid., 29, p. 214] and *S. delphinii* on *Iris* [ibid., 29, p. 215].

Patel (M. K.), Bhatt (V. V.), & Kulkarni (Y. S.). **Three new bacterial diseases of plants from Bombay.**—*Curr. Sci.*, 20, 12, pp. 326–327, 1951.

Descriptions are given of three new species of phytopathogenic bacteria, *Xanthomonas lawsoniae*, *X. tamarandi* [? *tamarindi*], and *X. poinsetticola*, observed in

different parts of Bombay between October and December, 1950, and of the effects produced on their respective hosts, *Lawsonia alba* [*L. inermis*], *Tamarindus indica*, and *Euphorbia pulcherrima*. *X. lawsoniae* produces small, round, watersoaked spots at the leaf margins, *X. tamarandi*, common on trees round Poona, induces small, round spots, pale brown at first with a yellow halo, later becoming jet-black, and *X. poinsetticola* causes a severe angular leaf spot. The last-named differs from *Corynebacterium poinsettiae* [see next abstract] in being Gram-negative and yellow.

Katznelson (H.) & Sutton (M. D.). **Inhibition of plant pathogenic bacteria in vitro by antibiotics and quaternary ammonium compounds.**—*Canad. J. Bot.*, 29, 3, pp. 270–278, 1951. [Received 1952.]

The bacteriostatic effect of certain antibiotics and quaternary ammonium compounds on representative genera and species of phytopathogenic bacteria [*R.A.M.*, 30, p. 360; 31, p. 276] was studied at the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa. Against the 13 species and two varieties of *Xanthomonas* tested aureomycin [ibid., 31, p. 54] was the most potent agent, followed by terramycin and polymyxin; 0·1 to 0·05 p.p.m. aureomycin completely inhibited growth of most of the cultures after 24 hours. *X. beticola* was somewhat more resistant to chloramphenicol, polymyxin, and streptomycin than the other species. *X. pruni* strain 1 was more resistant to neomycin than two other strains tested, and *X. vesicatoria* strain 1 was among the most resistant to neomycin, polymyxin, streptomycin, and terramycin. *X. undulosa* and *X. secalis* were among the most resistant to polymyxin.

Terramycin was the most effective compound against nine species of *Pseudomonas*, followed by streptomycin [ibid., 31, p. 415] and aureomycin; 0·2 to 0·1 p.p.m. terramycin inhibited the growth of every culture tested with one exception. *P. coronafaciens* was perhaps the most sensitive. *P. glycinea* strain 1 was among the most resistant to aureomycin, chloramphenicol, and terramycin. *P.* [*medicaginis* f.sp.] *phaseolicola* strain 1 was the most resistant to polymyxin, and *P. angulata* to streptomycin.

Aureomycin was the most effective against six species of *Corynebacterium* followed by neomycin and terramycin, the inhibitory concentration of aureomycin varying from 0·4 to 0·05 p.p.m. Chloramphenicol was the least effective of the antibiotics tested in this series of experiments. *C. sepedonicum* strains were in general more sensitive to antibiotics than the majority of the other *C.* spp. and *C. poinsettiae* among the most resistant.

A comparison of the relative sensitivity of the three genera to a given antibiotic revealed that aureomycin and polymyxin were the most effective against *Xanthomonas*, terramycin and streptomycin against *Pseudomonas*, and neomycin and chloramphenicol against *Corynebacterium*. *Erwinia amylovora* was most sensitive to streptomycin and *E. carotovora* to polymyxin; the latter organism was generally more resistant to antibiotics than the former. None of the other antibiotics or the quaternaries tested against strains of *X. phaseoli* and *P. medicaginis* f.sp. *phaseolicola* [ibid., 31, pp. 220, 468] was as effective as aureomycin, polymyxin, strepto mycin, or terramycin, the activity of the quaternaries being similar on the whole to that of chloramphenicol.

Dye (D. W.). **The effects of chemicals and antibiotic substances on crown-gall (Agrobacterium tumefaciens (Smith and Townsend) Conn). Part III.**—*N.Z. J. Sci. Tech.*, Sect. A, 33, 3, pp. 48–53, 1 graph, 1951.

In further experiments in this series [cf. *R.A.M.*, 31, p. 322] various chemical and antibiotic solutions were tested for the control of crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*). A 25 per cent. solution of elgetol [ibid., 31, p. 230] in methyl alcohol effectively killed galls on potted peach seedlings in the greenhouse

without injuring the host, but marigold (*Tagetes patula*) plants were severely damaged. A 2 per cent. elgetol solution and iodine and clove-oil solutions completely inhibited the growth of the bacterium *in vitro* and killed marigold galls rapidly without damage when brushed on but when injected killed the plants. Acidulated mercuric chloride (0·4 per cent.) significantly retarded bacterial growth *in vitro* and gall growth when brushed on the plants.

Nitsch (J. P.). **Action du jus de Tomate sur la croissance des tissus de crown-gall cultivés in vitro.** [Action of Tomato juice on the growth of crown gall tissues cultured *in vitro*.]—*C. R. Acad. Sci., Paris*, 233, 25, pp. 1676–1677, 1 graph, 1951.

Cultures of crown gall [*Bacterium tumefaciens*] tissues isolated from tobacco and *Opuntia monacantha* on a synthetic, vitamin-containing medium were stimulated by the addition of tomato juice [cf. *R.A.M.*, 29, p. 408]. Thus, five weeks after planting, the average fresh weights of six tobacco cultures with and without 10 per cent. tomato juice were 2,016 and 430 mg., respectively, the corresponding figures for *O. monacantha* after nine weeks with and without 25 per cent. tomato juice being 1,743 and 138 mg., respectively. At concentrations exceeding 25 per cent. the juice was toxic to the cultures.

Pohjakallio (O.). **Om den ekonomiska betydelsen av vårsädens rostsjukdomar i Finland.** [On the economic importance of spring cereal rust diseases in Finland.]—*Nord. Jordbr Forskn., 1951*, 2–3, pp. 480–485, 1951.

In this paper, presented at the eighth congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950, the author states that, although cereal rusts (*Puccinia* spp.) are widespread in Finland [*R.A.M.*, 31, p. 234], especially in the south, they are seldom responsible for reductions of any magnitude in spring-sown crops. Exceptions to this general rule (based on surveys of data relating to yields and rust incidence provided by two plant breeding stations, one covering the period from 1925 to 1945 and the other from 1922 to 1949) were the years 1932 and 1939, when severe droughts prevailed during the time of axis production.

Thorpe (H. C.). **A note on the release of some new cereal varieties. III.**—*E. Afr. agric. J.*, 17, 2, pp. 88–89, 1951.

The following new wheat varieties were released to farmers by the Department of Agriculture, Kenya, for sowing in the 1951–2 season. Wheat no.360.H (selected from 294.M.7.C.6.C×184 P.2.A.1.E) is fully resistant to all the races of stem rust (*Puccinia graminis tritici*) occurring in the Colony, including K9 [*R.A.M.*, 31, p. 173], possesses good resistance to brown rust (*P. triticina*) [ibid., 28, p. 517], and has shown resistance to yellow rust (*P. glumarum*) [loc. cit.] up to 8,500 ft. Wheat no.337.BE.2.F.2. (selected from 223.F.1.A.3×291.J.1.B.1.) is resistant to all but K9 of the stem rust races, possesses good resistance to brown rust, and has shown resistance to yellow rust up to 9,500 ft. Wheat no.338.AA.1.A.2. (selected from 192.Q.2.A.L.×Australian 27/2.2.1.5.) was fully resistant to stem rust races 1 to 8 in seedling tests but susceptible to K9. It has not been attacked by stem rust in the field. It possesses resistance to brown and yellow rusts up to 7,000 ft. Wheat no.184.P.2.A.1.A. (selected from Reliance×286.B6.Y.(L)) was fully resistant in seedling tests to all the races of stem rust, and is resistant to brown and yellow rusts up to 6,500 ft. Wheat no.350.AD.9.C.2. (selected from 223.F.1.A.3.×294.M.7.C.8.) is fully resistant to stem rust races 1 to 8 but susceptible to K9 in seedling tests. It resists brown and yellow rusts up to approximately 8,500 ft. Wheat no.341.F. 2.D.1. (selected from 279.1.5.F.2.×Eureka G. 2503) was susceptible in seedling tests to races K8 and K9 but is resistant to brown and yellow rusts up to 9,000 ft.

Borlaug (N. E.), Campos (T. A.), & Bayles (B. B.). **Mexican varieties of Wheat resistant to race 15B of stem rust.**—*Plant Dis. Reptr*, 36, 4, pp. 147–150, 1952. [Multilithed.]

The very severe epidemic of wheat stem rust (*Puccinia graminis tritici*) in Mexico during the summer of 1951 afforded an excellent opportunity of studying the field reaction of commercial varieties to the widely distributed race 15B [*R.A.M.*, 31, pp. 371, 378]. All the commercial varieties of spring wheats (bread and durums) currently grown in North America were severely rusted, with the exception of Kentana 48, Lerma 50, Kenya Rojo [ibid., 31, p. 110], and Kenya Blanco. Also resistant were 14 parental varieties or lines being used in bread wheat breeding programmes in North America, 19 bread wheat introductions from the World Wheat Collection tested for the first time, 20 durums or Poulard wheat introductions from the same collection (including one *Triticum persicum* line), and advanced generation lines of 26 crosses from different breeding programmes in America.

Shebeski (L. H.) & Wu (Y. S.). **Inheritance in Wheat of stem rust resistance derived from Agropyron elongatum.**—*Sci. Agric.*, 32, 1, pp. 26–35, 1952.

In a study at the University of Saskatchewan, Canada, of the mode of inheritance in seedling wheat of stem rust [*Puccinia graminis*] resistance [cf. *R.A.M.*, 19, p. 647; 20, p. 158; 29, p. 495; 30, p. 507] from *Agropyron elongatum*, using F_1 and F_2 progenies of crosses of Apex, Thatcher, and Red Egyptian each with Perennial Wheat 357–5 (from a Chinese × (Chinese × *A. elongatum*) cross made in 1939), over 4,000 seeds were sown in one greenhouse bed. At the two-leaf stage the moistened leaves were gently rubbed between the fingers and a uredospore suspension was sprayed over them [cf. ibid., 26, p. 193]. Finally, a mixture of one part uredospores and five parts talc was dusted over the moistened leaves. The bed (thoroughly watered) was then covered with a plastic tent, the air temperature reduced to 50° F., and the seedlings incubated thus for 48 hours.

The results taken two weeks later showed that Apex and Chinese were susceptible to the rust collection used (mainly race 56), whereas Thatcher, Red Egyptian, and P.W. 357–5 were highly resistant. Resistance contributed by P.W. 357–5 was dominant in the F_1 progenies of the three crosses. From the cross Apex × P.W. 357–5 it was concluded that three complementary factor pairs governing resistance are present in the perennial wheat. From the cross Thatcher × P.W. 357–5, assuming that three complementary dominant genes for resistance are present in P.W. 357–5 and three recessive resistant genes in Thatcher, a good fit was obtained with the calculated and actual ratios. There was also complementary action between the dominant and recessive resistant genes. As Chinese is susceptible to the race of stem rust used, resistance in the perennial wheat probably came from *A. elongatum*.

A further note records that since this paper was written a sister line of P.W. 357–5, S–44–2–7, has been reported by C. O. Johnson as resistant to race 15B of stem rust.

Hassebrauk (K.). **Die Einwirkung neuzeitlicher Kontaktinsektizide auf die Braunrostanfälligkeit von Weizenkeimpflanzen.** [The influence of modern contact insecticides on the susceptibility to brown rust of Wheat seedlings.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, 3, 11, pp. 161–164, 1951.

At the Institute of Physiological Botany, Brunswick, Germany, one application to seedlings of wheat varieties with differing reactions to brown rust (*Puccinia triticina*) of several newly developed contact insecticides at standard dosages induced modifications, in part considerable, in the responses of the plants to

inoculation [cf. *R.A.M.*, 31, p. 204], which was effected 24 hours earlier. Thus, DDT greatly enhanced the susceptibility of Rufenach VI and Roter Tiroler Spelz to line 1185 of the rust and of Peines Défiance to line 1176 [cf. ibid., 25, p. 336]. In many cases, too, the treatment increased chlorosis in the zone of infection, irrespective of alterations in reaction to the rust.

The effect of *gamma* BHC was relatively weak and also inconsistent. However, the susceptibility of Hildebrandts Weisser Viktoria and Belaturka was slightly enhanced and the resistance of Abundance Gold Coin intensified. The two BHC preparations, DKH and synthal, produced contrary effects, the former tending to raise and the latter to depress the power of resistance; under the influence of synthal fructification of the rust was markedly accelerated and the production of uredosori exceptionally copious.

Spraying with 50 per cent. E 605 f [ibid., 28, p. 586] generally increased resistance through a lowering of the reproductive activity of the rust and an intensification of chlorosis.

Noll (A.). **Über anomale Kieselsäureablagerungen bei Gelbrostinfektion (Puccinia glumarum) des Weizens.** [On anomalous silicic acid deposits in yellow rust infection (*Puccinia glumarum*) of Wheat.]—*Phytopath. Z.*, 16, 4, pp. 483–491, 2 figs., 1950. [Received April, 1952.]

The abnormal accumulation of silicic acid in the leaf tissues of resistant wheat varieties infected by yellow rust (*Puccinia glumarum*), incidentally observed in the course of earlier cytological studies [*R.A.M.*, 24, p. 141; 31, p. 110], was further investigated at the Brunswick branch of the Biological Institute in greenhouse seedlings of Rouge Prolific bearded, Heines Kolben, and Spaldings Prolific, and in field plants of an unknown, highly resistant variety, Riéti bearded, Breustedts Extra Dickkopf, Kanred, a line of Heines Kolben with hereditary leaf necrosis, and a large number of varieties displaying a profusion of minute, chlorotic pits, often with brownish centres, on the leaves, predominantly the upper ones. All these varieties were resistant or highly resistant. Races 2, 7 [loc. cit.], 23 [ibid., 29, p. 149], and an undetermined race were used for the greenhouse tests and race 1 [ibid., 19, p. 77] for the field trials.

Previous observations as to the presence of excessive amounts of silicic acid in the infected tissues, especially of field plants, were confirmed. The deposit on the cell walls and in the cells is colourless and lustrous, and in the lumen somewhat granular. There is usually at least one stoma in the silicated tissue complex, and the guard cells are also frequently involved. The confluence of isolated foci (up to $\frac{2}{3}$ mm. in diameter, for instance, in Kanred), originating round the stomata, may produce wide areas of silicated tissue, notably in the mesophyll of varieties with so-called 'summer resistance'.

The accumulation of silicic acid is considered to be a non-specific, secondary concomitant of other local cytological changes in tissues infected by yellow rust, of no significance in relation to immunology.

Flensberg (R.). **Untersuchungen über die Warmwasserbeize unter besonderer Berücksichtigung des Warmwasserdauerbades.** [Investigations on the hot water steep, with special reference to the continuous hot water bath.]—*Phytopath. Z.*, 16, 1, pp. 1–40, 24 graphs, 1949. [Received April, 1952.]

The results of laboratory and field experiments conducted at the Botanical Institute of the Technical College, Brunswick, Germany, from 1946 to 1948 to determine the applicability of the continuous hot water bath treatment to the control of wheat loose smut [*Ustilago tritici*: *R.A.M.*, 15, p. 787; 21, p. 411; 29, p. 409] are fully tabulated and discussed in the light of 51 contributions to the

literature on the subject. The method is regarded as superior to the usual procedure of immersion in hot water after pre-soaking [ibid., 29, p. 206].

The optimum temperature and duration of the bath were fixed at 46° C. and 2½ hours, respectively [cf. ibid., 30, p. 460]. The addition of 0·025 to 0·03 per cent. ceresan to the water stimulated germination. The customary practice of subsequent immersion in cold water may safely be omitted, since a rapid drop in temperature ensues when the seed is simply spread out to dry. Deleterious effects of steeping may be perceived more clearly by germination at 1° or 25° than at 15°. During protracted storage (over a year) steeped seed lost its germinability more rapidly than untreated.

An increase of 65 to 70 per cent. in the water content of the embryo is a prerequisite condition for the elimination of loose smut, the level for the endosperm being considerably lower. During the re-drying process the water content of the embryo falls faster than that of the endosperm and when it reaches about 30 per cent. it is on a level with the latter and subsequently drops below it. Quick drying immediately after treatment is more harmful to germination than slow, but no ill effects were observed when the seed was dried rapidly after a 24-hour interval. The use of furnace exhaust gases for drying was accompanied by substantial reductions in germination and should be avoided. Mechanical injury to the seed before treatment does not greatly increase the reduction of germination by the hot-water bath, but moist, treated seed is extremely sensitive to the shaking and jolting incidental to modern methods of transport.

Lansade (M.), Ponchet (J.), & Guntz (M.). **Nouveaux essais de traitement de la carie du Blé : Tilletia tritici (Bjerk.) Wint.** [New tests on the control of Wheat bunt: *Tilletia tritici* (Bjerk.) Wint.]—*Ann. Épiphyt.*, 2, 3–4, pp. 417–449, 6 graphs, 1951.

Some of the results of these comprehensive field and laboratory tests carried out at Versailles from 1943 to 1949 with numerous products for the control of wheat bunt (*Tilletia tritici*) [*T. caries*: *R.A.M.*, 31, p. 234], using the method of Arnaud and Gaudineau [ibid., 9, p. 637], have already been reported [ibid., 26, p. 295; 29, p. 409]. Formalin was active at a concentration of 0·25 per cent. and became injurious to wheat at 1 per cent. and more. The numerous products tested are listed in three categories: (1) effective (under 0·8 per cent. bunted ears), (2) moderately effective (2 to 3 per cent.), and (3) ineffective. Category (1) includes, in addition to those previously recorded, copper nitrosalicylate (17 per cent. copper) and category (2) chlorosalicylic acid, acetochlorosalicylic acid, dithiosalicylic acid, zinc ethylxanthate, cadmium methyldithiocarbamate, methylchloroacetamide, ortho-phenylphenate [cf. ibid., 26, p. 179], thiram, and thiocarbanilide. Tables are given (pp. 435–449) showing the preparations tested from 1945 to 1949, dosage used, and percentage of bunted ears resulting.

Meyer (Helene). **Über den Einfluss von Cadmium auf die Krankheitsbereitschaft des Weizens für Erysiphe graminis tritici Marchal.** [On the influence of cadmium on the susceptibility of Wheat to *Erysiphe graminis tritici* Marchal.] —*Phytopath. Z.*, 17, 1, pp. 63–80, 1 fig., 2 graphs, 1950. [Received April, 1952.]

Sempio's claim that the addition of cadmium nitrate to a nutrient solution reduces the incidence of mildew (*Erysiphe graminis tritici*) on certain wheat varieties [*R.A.M.*, 19, p. 108] was investigated at the Federal Technical College, Zürich, Switzerland. The chloride, nitrate, and sulphate at a concentration of 10^{-3} mol. per l. nutrient solution (modified Knop's) were well tolerated by Alpha summer and Huron winter wheat seedlings in quartz sand; at higher dosages the compounds materially retarded growth. The conidia of the pathogen germinated normally in a solution of 10^{-5} mol. cadmium nitrate per l. water. Sempio's findings

were substantiated in the cases of mild infection on Frassineto and some of the other varieties used in his original experiments, but cadmium nitrate conferred no protection against heavier attacks and was quite unavailing once the disease had gained a foothold. The cadmium content of the host (about 1·5 mg. per 100 gm. fresh plant weight in the varieties used) did not suffice to explain the reduction in the incidence of mildew, which is probably evoked by the interplay of a number of factors modifying the constitution of the plant.

Stapp (C.). **Die Spelzenbräune des Weizens.** [Glume browning of Wheat.]—*Phytopath. Z.*, 16, 3, pp. 359–367, 1950. [Received April, 1952.]

This is an expanded account of the author's examination of Bavarian wheat samples suffering from a browning disease of the glumes having no connexion with *Xanthomonas translucens* f.sp. *undulosa*, a preliminary note on which has already appeared [*R.A.M.*, 29, p. 205].

Russell (R. C.) & Popp (W.). **The embryo test as a method of forecasting loose-smut infection in Barley.**—*Sci. Agric.*, 31, 12, pp. 559–565, 1951.

At the Dominion Laboratories of Plant Pathology at Saskatoon and Winnipeg 91 samples of barley seed from the 1949 crop grown in six provinces of Canada were examined for loose smut (*Ustilago nuda*) [*R.A.M.*, 30, p. 461]. Embryo tests on each of the samples, using Popp's method [loc. cit.] at Winnipeg and that of Simmonds [ibid., 25, p. 258] at Saskatoon, indicated an average seed infection of 1·8 and 1·49 per cent., respectively, which was in close agreement with the amount of infection in plants grown from these seed samples in 1950 (1·6 and 1·47 per cent. infected heads, respectively). The embryo test gave a better indication of infection than inspection of the 1949 standing crop, which revealed only 0·49 per cent. loose smut, and may be of use to plant breeders, officials responsible for seed certification, and seed growers.

Paulus (A.) & Starr (G. H.). **Control of loose smut with antibiotics.**—*Agron. J.*, 43, 12, p. 617, 1951.

Tests were initiated in 1950 at the Wyoming Agricultural Experiment Station to determine the possibility of controlling barley loose smut [*Ustilago nuda*] by means of antibiotics. None of the eight substances applied to the susceptible Beecher variety (9,000 plants for each treatment) at a dilution of 1 in 100 eliminated infection, though streptomycin sulphate reduced it by one half in comparison with untreated samples and is being used in further trials.

Lejeune (A. J.), Sisler (W. W.), Banasik (C. J.), & Harris (R. H.). **Methods of breeding new malting Barley varieties.**—*J. Inst. Brew.*, N.S., 48, 6, pp. 445–449, 1951.

At the North Dakota Agricultural Experiment Station extensive selection from the progeny of a cross between Kindred (L) and Titan barley has resulted in the development of a number of promising new hybrids. Methods of selection are fully described, great importance being attached to the need for quality tests at an early stage in the breeding programme, among the objectives of which are freedom from diseases, including stem rust [*Puccinia graminis*], loose smut [*Ustilago nuda*: *R.A.M.*, 31, p. 324], and spot blotch (*Helminthosporium sativum*) [ibid., 30, p. 605]. Kindred (L) is resistant to *P. graminis* and *H. sativum* but susceptible to *U. nuda*, while Titan is resistant to *U. nuda* but susceptible to the other two pathogens.

[An expanded, tabulated version of this project appears in *Brew. Dig.*, 26, 5, pp. 57–63, 6 graphs, 1951.]

Welsh (J. N.) & Johnson (T.). **The source of resistance and the inheritance of reaction to 12 physiologic races of stem rust, Puccinia graminis avenae (Erikss. and Henn.).**—*Canad. J. Bot.*, 29, 3, pp. 189–205, 1 pl., 1951. [Received 1952.]

Resistance to 12 races of oat stem rust (*Puccinia graminis avenae*) [*R.A.M.*, 30, pp. 103, 604; 31, p. 52 and next abstract] was obtained unexpectedly from crosses of Hajira with Jostrain, Richland, and Banner between 1932 and 1940. Recent greenhouse and field experiments have shown that the Hajira parent was the source of resistance, 10 per cent. of the plants selected from this variety being highly resistant. In some crosses involving Hajira two main genes were involved and in others only one. Lines that were resistant to race 8 in the seedling stage were also resistant to the other 11 races occurring in Canada and the United States, although with race 6 resistance was influenced by temperature to a large extent. Furthermore there was a very close agreement between the seedling reactions to race 8 and the field resistance to all races.

Johnson (T.) & Green (G. J.). **The varieties of stem rust, Puccinia graminis Pers., occurring on Barberry in Eastern Canada.**—*Canad. J. Bot.*, 29, 1, pp. 1–9, 1951. [Received 1952.]

A study of 139 collections of aecidia on barberry in Eastern Canada [*R.A.M.*, 26, p. 8] from 1944 to 1949 disclosed that *Puccinia graminis* var. *secalis* [ibid., 13, p. 753; 19, p. 395; 31, p. 278] was present in 103, var. *agrostidis* in 55, var. *avenae* [see preceding abstract] in 33, var. *poae* in nine, and var. *tritici* in eight collections. Of the var. *avenae* isolates the following physiologic races were determined (frequency of isolation in brackets): 1 (1), 2 (15), 5 (8), 6 (2), 7 (4) [ibid., 31, p. 52], 8 (6), 10 (3), 11 (1), and 12 (1). The isolates of var. *tritici* constituted races 15 (3) and one each of 21, 38, 56, 87, and 111. Evidence from field surveys supports these results in indicating the frequent spread of var. *secalis* from barberry to susceptible grasses and of var. *avenae* to oats.

Gorter (G. J. M. A.). **Streak disease in Maize—helpful measures for its prevention.**—*Fmg in S. Afr.*, 26, 308, pp. 361–362, 364, 2 figs., 1951.

Maize streak virus [*R.A.M.*, 30, pp. 141, 156; 31, p. 184] has become increasingly troublesome in the warmer, irrigated areas of the Transvaal during recent years. Among the cultural measures recommended for control of the disease [ibid., 26, p. 194; 29, p. 289] the author suggests that maize should be planted early, though not so that the growing period overlaps with winter cereals, and well away from other cereals or old stubble lands. Harrowing immediately before planting disturbs the migration of the leafhopper (*Cicadulina mbila*) vectors and results in lower initial infection.

McKeen (W. E.). **A seed-borne disease of Corn.**—*Plant Dis. Reptr*, 36, 4, pp. 145–146, 5 figs., 1952. [Multilithed.]

In July, 1949, leaf-spotting developed on the maize inbred line 13 at Harrow, Ontario, after three years of selfing. The plants exhibited a wide range of symptoms, varying from a few lesions to numerous rings on all the leaves, except a few lower ones, and often on the husks and sheaths as well. They originated as a minute, clear spot, frequently with a necrotic centre and later surrounded by alternately clear and necrotic concentric rings. Several severely affected plants developed no ears. Symptom expression was favoured by hot, sunny weather. Numerous attempts at transmission to various hosts failed.

Riley (E. A.). **Hybrid Maize resistance tests. Progress report, 1950–51.**—*Rhod. agric. J.*, 48, 5, p. 428, 1951.

The results of cob inoculations of maize hybrids in disease resistance tests in

Rhodesia during 1950–1 are summarized. Inoculation with each of the following pathogens separately showed that *Fusarium moniliforme* [*Gibberella fujikuroi*: cf. *R.A.M.*, 30, p. 563] was only mildly parasitic, whereas *G. fujikuroi* var. *subglutinans* [loc. cit. and ibid., 30, p. 511] and *F. graminearum* [*G. zeae*: ibid., 30, p. 563] were highly virulent, extensively damaging the ear sheath and affecting several grains round the inoculation site. Different maize strains displayed widely varying reactions to the *G.* species, some showing marked resistance. No strain was resistant to *Diplodia zeae* [ibid., 29, p. 574], which establishes a weft of mycelium between the layers of the ear sheath, completely involving the cob and causing extensive damage. Strains for breeding should be chosen for resistance to the more aggressive organisms, e.g., *G. fujikuroi* var. *subglutinans* and *G. zeae*. Those with resistance to the greatest number of pathogens are, as a rule, the best in other respects, including yield.

Muntañola (María). **La bacteriosis de los Sorgos debida a 'Pseudomonas andropogoni' (E. F. Smith) Stapp en la República Argentina.** [Bacteriosis of Sorghums due to *Pseudomonas andropogoni* (E. F. Smith) Stapp in the Argentine Republic.]—*Lilloa*, 23, pp. 307–317, 6 pl., 1950. [English summary. Received May, 1952.]

An account is given of the symptoms, host range, pathogenicity, taxonomy, factors affecting the development and diffusion of, and damage caused by bacterial stripe of sorghum (*Pseudomonas andropogoni*) [*R.A.M.*, 8, p. 440; 29, p. 411] in Argentina. The susceptible *Sorghum technicum* [*S. bicolor* var. *technicus*] is particularly affected in the humid areas of Buenos Aires and Entre Ríos. In some densely cultivated areas 100 per cent. of the plants are attacked.

Both field and greenhouse experiments demonstrated the high resistance of the graniferous and field sorghums (*S. caffrorum*, *S. almum*, and Sudan grass). Of various graniferous species imported from the United States the varieties Dwarf Hegari and Dwarf Yellow Milo were entirely resistant and Hegari, Weskam Kafir, and Finney Milo only slightly affected. In tests at the Provincial Agricultural Experiment Station, Tucumán, the *S. saccharatum* varieties Collier MN45 and White African MN34 were resistant while Honey Drip and Rex MN23 were only slightly affected. The disease is seldom observed in Tucumán owing to the long droughts.

Laboratory experiments demonstrated the ability of the bacterium to overwinter in the soil in conditions of high humidity. The growth of *P. andropogoni* in culture was inhibited by a species of *Bacillus*.

Crop rotation, burning of stubble, and planting seedlings well apart are recommended for control.

Pupillo (M.). **Un marciume dei frutti di Limone prodotto da una associazione di micromiceti.** [A rot of Lemon fruits produced by an association of microfungi.] —*Ann. Sper. agr.*, N.S., 6, 1, pp. 53–67, 9 figs., 3 graphs, 1952. [English summary.]

Early in 1950 lemon fruits from plants grown near Bologna and kept in pots in a greenhouse during the winter developed withering and spotting of the skin together with extensive pulp rot. From the infected material *Gloeosporium pedemontanum* n.sp., *Septoria limonum* [*R.A.M.*, 3, p. 196; 22, p. 131], and *Peyronellaea prunicola* [formerly *Phoma prunicola*: cf. ibid., 24, p. 422; 26, p. 356; 27, p. 339] were isolated. *G. pedemontanum* is characterized by subcuticular or, less often, subepidermal, sparse or gregarious, isodiametrical or oblong acervuli mostly measuring 88 to 211 by 83 μ, branched, multicellular conidiophores 35 μ long, and hyaline, oblong-ovate conidia mostly measuring 12 by 4·5 μ. The conidia of the author's isolate of *S. limonum* were straight or curved, unicellular or uni- or biseptate, and measured 13·5 by 2·5 μ.

Inoculations of lemon fruits with the three fungi separately and together failed to reproduce the severe rotting observed in nature; only the inoculations with *S. limonum* gave any positive results, producing circular necrotic areas a few mm. in diameter involving the albedo.

FIEDLER (O. G. H.). **Chlorose des Kaffees in Ostafrika.** [Chlorosis of Coffee in East Africa.]—*Phytopath. Z.*, 17, 1, pp. 111–114, 1950. [Received April, 1952.]

During a visit to Tanganyika and Kenya the author encountered a form of coffee chlorosis quite distinct from that associated with mineral deficiencies and more suggestive of the disease reported by Morstatt [*R.A.M.*, 15, p. 577] from Angola and São Tomé Island [Gulf of Guinea] under the name of 'sudden death', which is caused by excessive intensity of the sun's rays [cf. ibid., 20, p. 573]. The Kent and Blue Mountain varieties of *Coffea arabica*, grown without shade on the southern and south-easterly slopes of extinct volcanoes at an altitude of 1,550 to 1,800 m., sustain heavy damage during the period from May to July, following the rainy season. The leaf veins retain their green colour but the lamina turns yellow or even whitish in places, and abnormally heavy defoliation denudes the branches of all but a few pairs of leaves at the tip. Trees of all ages are affected and even the youngest leaves at the growing point become uniformly chlorotic.

The disorder has hitherto been attributed to a combination of nitrogen deficiency and the influence of cold east winds, but in the author's opinion the primary factors are the intense sunlight and the misty drizzle preceding it during the early part of the day.

Support is lent to this view by various considerations, including the fact that the symptoms gradually abate during August and September, when the differences between day and night temperatures lessen and the drizzle ceases, as well as by the normal appearance of coffee growing under sparse shade.

MAHMUD (K. A.). **Damping-off of Cotton seedlings caused by Pythium de Baryanum Hesse.**—*Sci. & Cult.*, 16, 9, pp. 422–424, 8 figs., 1951. [Received August, 1952.]

In July, 1948, the Buri 107 and Verum 434 cotton varieties at the Nagpur Experimental Farm, India, had 7 and 13 per cent. damping-off caused by *Pythium debaryanum* [cf. *R.A.M.*, 17, p. 522], not previously recorded on cotton in India.

CURY (R.). **Micoses das Abelhas e fungos das colméias.** [Bee mycoses and beehive fungi.]—*Biológico*, 17, 12, pp. 214–220, 1951.

Further information is presented on the etiology, symptoms, transmission, pathogenicity, diagnosis, prophylaxis, and treatment of the fungal diseases affecting bees in Brazil [*R.A.M.*, 26, p. 200]. Among the causal organisms, besides those already mentioned, are *Mucor melitophorus*, *M. mucedo*, *Melanosella mors-apis*, *Rhizopus equinus*, and *Scopulariopsis brevicaulis*. Beehives are inhabited by a number of fungi, including *Oospora favorum*, *Pericystis apis*, and the extremely noxious *P. alvei*, which contaminates the pollen, its effects being particularly serious during the winter, when provisions cannot be renewed.

VITAL (A. F.). **Um caso interessante de simbiose entre Stysanus microsporus Sacc. e Platypus difficilis Chapp. sôbre Eschweilera luschnathii Miers.** [An interesting case of symbiosis between *Stysanus microsporus* Sacc. and *Platypus difficilis* Chapp. on *Eschweilera luschnathii* Miers.]—*Bol. Sec. Agric. Pernambuco*, 18, 3–4, pp. 177–179, 1951. [English summary.]

In Pernambuco, Brazil, *Eschweilera luschnathii*, a valuable forest tree, is parasitized jointly by *Stysanus microsporus* [*R.A.M.*, 10, p. 242], originally isolated

by Saccardo from decayed *Robinia pseudo-acacia* wood in France and Italy, and a beetle, *Platypus difficilis*. The association, probably of a symbiotic character, results in the death of the host.

Stoner (W. N.), Stevenson (F. V.), Genung (W. G.), Thames (W. H.), Seale (C. C.), Gangstad (E. O.), & Pate (J. B.). **Preliminary reports of some of the disease and pest problems of Kenaf, Hibiscus cannabinus, L., in South Florida.**—*Plant Dis. Reptr*, 36, 4, pp. 121–126, 4 figs., 1952. [Multilithed.]

During the summer of 1951 2,500 acres of kenaf were grown in Florida in an area extending from Vero Beach in the north to Belle Glade in the west and Fort Lauderdale in the south. The crop, in its first year of extensive planting, suffered severely from various disorders, the most serious of which, believed to be due to a virus and probably transmitted by a winged insect vector, was observed throughout the area of production. In some cases it substantially reduced yields of seed and fibre. Of several varieties of kenaf examined in the breeding nursery at the Everglades Experiment Station, approximately 80 per cent. were infected.

As the commercial planting began to mature symptoms consistently associated with *Colletotrichum hibisci* [*R.A.M.*, 6, p. 419] developed. *Fusarium* wilt was very severe in a field where tomatoes had been grown the previous year [cf. ibid., 22, p. 65]. The position of the former tomato beds was marked by swathes of dead kenaf plants across the field.

A severe stem blight, tentatively ascribed to *Sclerotium bataticola* [*Macrophomina phaseoli*: ibid., 15, p. 648], caused silvery, dark brown, watersoaked lesions which eventually turned black; it may be transmitted by the gerambycid beetle, *Hippopsis lemniscata*, since many stem lesions seemed to originate from the feeding and ovipositing sites. An *Ascochyta* leaf blight [ibid., 13, p. 373] and *Rhizoctonia* sp. [ibid., 19, p. 220] were also present.

The commercial kenaf variety grown in Florida and closely related types are very susceptible to both nematodes and the associated *Fusarium* wilt [ibid., 13, p. 375]. Several *Hibiscus* ornamentals, however, are very resistant, and appear to be the most promising sources of resistance to both disorders.

Flor (H. H.). **Genes for resistance to rust in Victory Flax.**—*Agron. J.*, 43, 11, pp. 527–531, 1951.

When 18 selected lines of the Victory flax variety, which is derived from a Czechoslovakian selection crossed with Argentine and then with Smoky Golden, were inoculated at the North Dakota Agricultural Experiment Station with F_2 cultures of race 22 × race 24 of *Melampsora lini* [*R.A.M.*, 26, p. 489], they fell into four groups for rust reaction. Race 208 attacked the four lines of group A, races 47, 66, 73, 85, and 102 the three of group C, race 60 those of both A and C, 93 groups A and D (the latter comprising five lines), and 67 the five of group B; one line segregated into B and C types. A rust genotype for each line was postulated, based on the number of hybrid cultures infecting it and on their comparative pathogenicity.

Resistance in group A was conditioned by a hitherto unknown gene M^7; in C by the Newland gene M; in B by the Newland and Victory B genes MN^5; and in D by M^7N^5. This interpretation was corroborated in studies on the segregation for reaction to selected hybrid rust races of F_2 populations of crosses of the lines composing the four Victory groups with the susceptible Bison and varieties with rust-conditioning genes in the L (J.W.S.), M (Newland), and N (Bombay) series. In some crosses involving genes in the N series the fit of the observed to the expected ratios was poor, denoting irregular segregation.

Lines possessing only the Victory B gene (N^5) were isolated from Victory B × Bison and Victory D × Bison. Races pathogenic to lines of the Victory A group

have been known since 1943, while races attacking those of C were encountered in 1948. N^5 continues to condition resistance to all the recognized North American races of *M. lini*.

MAGIE (R. O.). **Soil-minor element deficiencies.**—*Gladiol. Mag.*, 15, 4, pp. 18–21, 3 figs., 1951. [Received 1952.]

A disorder affecting *Gladiolus* in Florida about three years ago, characterized by soft spikes, weak, soft stems, and flaccid leaves, was corrected by spraying with a fixed copper compound and scattering 45 lb. copper sulphate per acre before planting again. This condition occurs only on new land in plants from corms grown two years in succession on this land. The varieties Valeria and Snow Princess were affected most severely. Soft spikes caused by insufficient potassium to balance the nitrogen supply were prevented by spraying as they developed with 5 lb. potassium sulphate or carbonate in 100 gals. water.

With boron deficiency the young leaves were stunted, thickened, and brittle and the leaf edges sometimes thin, cracked, and colourless. In older plants the cracking occurred near the base of larger leaves. It was corrected by using a fertilizer containing enough boron to supply 4 lb. boric oxide or 10 lb. borax per acre, or by spraying every two weeks until flowering with 1 lb. borax in 100 gals. water.

The leaves of iron deficient plants [*R.A.M.*, 29, p. 88] developed entirely yellow for several years in the Sanford district of Florida, chiefly in soils with high copper residues. In the case of manganese deficiency the leaf veins tend to remain green when the leaf is yellow. When manganese is used in a fertilizer a soluble iron salt should be added to avoid upsetting the iron-manganese balance.

MAGIE (R. O.). **Botrytis and Curvularia diseases of Gladiolus.**—Reprinted from *Bull. N.Amer. Gladiol. Coun., 1951*, pp. 1–6, 6 figs., 1951.

A description is given of the symptoms, factors affecting, and control of *Botrytis* disease, *B. gladiolorum* [*R.A.M.*, 31, p. 284], which is one of the most important on *Gladiolus* in the United States.

Young plants and flowers of most varieties are very susceptible to *Curvularia lunata* [ibid., 30, p. 453], particularly those grown from seeds and cormels, which are often attacked at or below soil level. Affected corms develop firm, sunken, black lesions and corking-out often occurs. Corm rot, however, is troublesome in only a few varieties. Infected plants or moist, infected soil provide a source of infection for the next crop which is reduced by digging in dry weather and curing with heat and fans immediately after harvest. The fungus survives for two years in sandy soil and may live for several years in competition with other soil fungi and bacteria. The flowers of all varieties tested were more or less susceptible when inoculated. Very few varieties were susceptible when grown from larger corms. Both diseases have been controlled satisfactorily in Florida for the past three years by zineb sprays (2 lb. in 100 gals. water) applied twice a week, or more often when necessary.

JENSEN (D. D.). **Virus diseases of Orchids.**—*Calif. Agric.*, 6, 1, pp. 3, 15, 4 figs., 1952.

The host range of the two viruses responsible for flower breaking of *Cattleya* [*R.A.M.*, 31, p. 434] in California includes 28 species and hybrids of *Cattleya*, 15 of *Laeliocattleya*, four of *Brassocattleya*, and two of *Brassolaeliocattleya*; *C. mossiae* and *C. trianae* are the most frequently infected. These viruses, however, have different host relationships. One is transmissible to *Cymbidium*, but not to *Odontoglossum grande* [ibid., 30, p. 610]. Mosaic [ibid., 31, p. 276] is present in some *Cattleya* plants imported into the United States from tropical America.

In further research work at the University of California, Berkeley, other viruses

also have been transmitted experimentally from *Dendrobium nobile*, *Laebia anceps*, *O. grande*, *Oncidium rogersi*, and *Vanda* Miss Joaquim orchids.

Beaumont (A.). **Diseases of Paeonies.**—*Gdnrs' Chron.*, Ser. 3, 132, 3419, p. 24, 1952.

Symptoms and the control of *Botrytis* blight of peonies [*B. paeoniae*: *R.A.M.*, 28, p. 456], widely distributed on this host in England, are described. The disease is also found to attack lily-of-the-valley. Two forms of virus diseases are also reported to occur in England: one, possibly [tomato] spotted wilt, has ring spot symptoms, and the other a mottle which may provisionally be called peony mosaic [ibid., 23, p. 439]. These, however, require further studies.

A. (F. W.). **Testing for Chrysanthemum mosaic.**—*Gdnrs' Chron.*, Ser. 3, 132, 3418, p. 14, 1952.

A technique, devised by the Virology Department, Cheshunt Research Station, for testing chrysanthemum plants for the presence of mosaic virus [cucumber mosaic virus: *R.A.M.*, 30, p. 231; 31, p. 239] is described. It is considered to be within the capacity of both amateur and professional growers. Three or four leaves of the plant under test are ground up with one dessert-spoonful of ½ per cent. freshly prepared sodium sulphite solution, which is then swabbed on to one or two well-developed leaves on a young *Nicotiana glutinosa* plant, previously dusted with fine carborundum powder. If the chrysanthemum plant is infected the *N. glutinosa* plant develops a conspicuous yellow-green mottle in ten to 30 days, according to the season. During raising and testing the *N. glutinosa* plant must be protected against insects carrying the virus.

Jefferson (R. N.) & Eads (C. O.). **Control of aphids transmitting Stock mosaic.**—*J. econ. Ent.*, 44, 6, pp. 878–882, 1951.

Aphid-transmitted mosaic viruses are stated to be responsible for heavy losses in Californian plantings of *Matthiola incana* var. *annua* [*R.A.M.*, 30, p. 569]. Important vectors are *Rhopalosiphum pseudobrassicae* (which breeds naturally on the host) and *Myzus persicae*. A tabulated survey is given of tests covering the period from 1947 to 1950 inclusive, to determine the comparative efficacy of several insecticides in the control of the aphids. Parathion [ibid., 31, p. 440] seemed to be the most effective, and no injury to the plants was caused by repeated applications of a wettable powder spray containing 0·15 lb. per 100 gals. However, when migrants are sufficiently numerous, a high incidence of flower breaking may occur despite frequent treatments. BHC and lindane gave good control of *R. pseudobrassicae* and reduced the amount of flower breaking, but they tended to cause stunting of the plants.

Gilpatrick (J. D.) & Weintraub (M.). **An unusual type of protection with the Carnation mosaic virus.**—*Science*, 115, 3,000, pp. 701–702, 1952.

Studies at the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, have shown that an unusual form of protection may occur with carnation mosaic virus [*R.A.M.*, 30, p. 568; 31, p. 123] in at least one host. Two seedling clones of the indicator *Dianthus barbatus*, inoculated with this virus by carborundum dusting, reacted by the development of primary local lesions only, while a third seedling clone developed only systemic mosaic symptoms. Leaves of one plant of the former type, which was healthy, and also apparently healthy, previously inoculated leaves of another plant of the same clone were detached and both were inoculated. Abundant lesions developed on the leaves of the former and one only on those of the latter, where protection appeared to be virtually complete. A significant

decrease was observed in the number of lesions that developed on the leaves of previously inoculated plants of clone 20 when compared with the number developing on the leaves of the corresponding healthy plants. According to the generally accepted hypothesis, these protected plants should be systemically infected. After sap transfers from apparently healthy leaves no symptoms appeared on any of the test plants, but the virus was recovered easily from the local primary lesions. So far a plausible alternative explanation for this phenomenon cannot be supplied.

Fabricatore (Jolanda A.). **Ascochyta trachelospermi n. sp. e considerazioni relative ad una possibile revisione del genere Peyronellaea.** [*Ascochyta trachelospermi* n. sp. and considerations on a possible revision of the genus *Peyronellaea*.]—*Ann. Sper. agr.*, N.S., 5, 6, pp. 1433–1446, 12 figs., 1951. [English summary.]

A fungus designated *Ascochyta trachelospermi* n.sp. was isolated from leaves of the ornamental climber *Trachelospermum jasminoides* in Rome bearing greyish, depressed spots often embedded in lesions. The pycnidia measure 148·2 to 228·8 by 150·8 to 223·6 μ when round and 156 to 234 by 135 to 156 μ when pyriform. The pycnoconidia, immersed in a mucilaginous substance, are at first hyaline and continuous, measuring 5·2 to 13 by 2·6 to 5·2 μ. Under certain conditions they become uniseptate and constricted at the septum, and measure 4·3 to 18·2 by 2·6 to 5·2 μ. Some days after the differentiation of the pycnidia, typical apical and intercalary, uni- or multicellular, hypnocystic structures similar to the conidia in the hyphal Dematiaceae are formed. They occur singly or in chains, and are generally clavate or fusiform, measuring 31·2 to 53·3 by 16·9 to 20·8 μ.

The fungus has certain morphological analogies with the genus *Peyronellaea* [see above, p. 487], notably in the differentiation of the primordia of the pycnidia, and in producing fructifications by abnormal hypnocyst development.

Mahmud (K. A.) & Jain (A. C.). **Damping off of Ipomoea pulchella Roth. due to Pythium aphanidermatum (Eds.) Fitz.**—*Sci. & Cult.*, 16, 11, p. 526, 1951. [Received August, 1952.]

Pythium aphanidermatum [*R.A.M.*, 12, p. 671] was isolated from 50 *Ipomoea pulchella* seedlings that had died as a result of damping-off disease in a nursery at Nagpur, India, in 1949. Pathogenicity tests, using autoclaved soil, all gave positive results.

Ribaldi (M.). **Su di una caratteristica maculatura fogliare del Ligustro (Ligustrum vulgare L.).** [On a characteristic leaf spot of Privet (*Ligustrum vulgare* L.).]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 95–100, 5 figs., 1952. [English summary.]

In the spring of 1951 the author observed near Turin a leaf spot of privet (*Ligustrum vulgare*) caused by *Ramularia ligustrina*, not previously recorded in Italy. The disease and the features of the organism are described.

Nema (K. G.) & Mahmud (K. A.). **Powdery mildew (Oidium sp.) on Crotalaria retusa Linn.**—*Sci. & Cult.*, 17, 1, p. 36, 1951.

Powdery mildew caused by an *Oidium* sp. [*R.A.M.*, 6, p. 380] was recorded for the first time on *Crotalaria retusa* at Nagpur, India, in 1950. Symptoms of the disease and the fungus are described in detail.

Slykhuis (J. T.). **Investigations on Sweetclover failure in southwestern Ontario.**—*Sci. Agric.*, 32, 1, pp. 1–18, 1 pl., 2 graphs, 1952.

In recent years sweet clover (*Melilotus alba* and *M. officinalis*) has become an uncertain crop in south-western Ontario, and most of the failures in Essex and

Kent counties from 1947 to 1949 were ascertained to be due to a root rot or to seedling blight. The principal pathogen causing the root rot, which destroyed a high percentage of the plants each year, was *Phytophthora cactorum* [*R.A.M.*, 31, p. 50]. This disease was most destructive in late April, and soil temperature appeared to be the chief factor affecting its seasonal severity. At Harrow in late April, 1949, the soil temperature varied, mostly from 6° to 16° C., and greenhouse experiments demonstrated that severe infection followed artificial inoculation of wounded roots at soil temperatures of 20° or less. The fungus grew most rapidly in culture at temperatures between 12° and 20°, the optimum being about 16°. The disease occurred more often and was more severe in heavy than in light soils. *M. suaveolens* seedlings were infected artificially.

Seedling blight, largely of the pre-emergence type, caused moderate to severe reductions of stands in many fields. The fungi most frequently isolated from affected seedlings included (in descending order of occurrence) *Fusarium* spp. [cf. ibid., 26, p. 549], *Pythium debaryanum* [loc. cit.], *P. ultimum* [loc. cit.], and *Rhizoctonia* [*Corticium*] *solani* [ibid., 20, p. 583]. *Ascochyta imperfecta* and *Mycosphaerella lethalis*, also isolated from roots, induced a high percentage of pre-emergence blight and some post-emergence in both steamed and unsteamed soil. *P. cactorum* caused considerable post-emergence blight but only in steamed soil. The addition of various starchy plant materials or dead sweet-clover roots to field soil significantly increased pre-emergence blight. Infection was more severe in crops following sweet clover, lucerne, or red clover than in those following soy-beans, maize, or wheat.

Venkatarayan (S. V.) & Delvi (M. H.). **Smut on Echinochloa colona Link.**—*Curr. Sci.*, 20, 12, pp. 329–330, 2 figs., 1951.

A smut found in October, 1949, producing galls on the stems and nodes and sometimes on the rachis of the inflorescence of *Echinochloa colonum*, a valuable fodder grass in Mysore, was identified as *Ustilago crus-galli* [*R.A.M.*, 24, p. 16]. The irregular or elongated galls range from 2 to 12 mm. in length and 2 to 4 mm. in thickness, and occur crowded together, imparting to the sori the appearance of brain-like folds.

Meiners (J. P.). **A new race of head smut on Bromar variety of Mountain Brome.**—*Plant Dis. Reptr*, 36, 4, p. 166, 1952. [Multilithed.]

In the summer of 1950 heavy infestations of head smut (*Ustilago bullata*) occurred in fields of the hitherto resistant Bromar variety of mountain brome grass (*Bromus marginatus*) [*R.A.M.*, 31, p. 124] in seed-producing areas of Eastern Washington. Inoculation experiments demonstrated that a new race of the fungus was involved.

Cormack (M. W.). **Variation in the cultural characteristics and pathogenicity of Fusarium avenaceum and F. arthrosporioides.**—*Canad. J. Bot.*, 29, 1, pp. 32–45, 2 pl., 1951. [Received 1952.]

The variants which occurred commonly in isolates of *Fusarium avenaceum* [*R.A.M.*, 28, p. 447] and *F. arthrosporioides* [ibid., 27, p. 241] from diseased roots of lucerne and other hosts in Alberta were of two kinds: (1) mycelial variants, originating as sectors or patches, which tended to revert partially to the 'wild type' [cf. ibid., 31, p. 258] or to produce further variants, and (2) spore variants, mostly heavily sporulating and relatively stable, which developed from single macroconidia. Both kinds appeared under a wide range of environmental conditions, but were distinct from the temporary cultural changes sometimes produced by varying these conditions. Variation followed a similar pattern in each species, though the isolates differed greatly in the number and type of variants produced.

Some which were relatively stable in cultural characteristics produced many spore variants and vice versa. Taxonomic comparisons indicated that classification should be based on the original characteristics of the wild types rather than on their range of cultural variation. No evidence was obtained to justify the inclusion of *F. avenaceum* and *F. arthrosporioides* in grouping as one species all members of *Roseum* and of several other sections (cf. Wollenweber and Reinking's classification) [ibid., 25, p. 366, and above, p. 471]. The wild types remained viable longer than any of the variants in dried soil culture; this medium was suitable for inoculum and storage purposes as variants developed infrequently in it. All variants were less virulent than their parent wild types in infection tests on roots of lucerne and sweet clover. This emphasizes the necessity of using the wild types of stable isolates in varietal resistance tests and other infection experiments.

Mulder (D.). **Der Zinkmangel im europäischen Obstbau.** [Zinc deficiency in European fruit trees.]—*Phytopath. Z.*, 16, 4, pp. 510–511, 1950. [Received April, 1952.]

The author has observed zinc deficiency in fruit trees in Denmark and France [*R.A.M.*, 27, p. 424; 29, pp. 159, 312; 31, p. 223 and next abstract]. The deficiency chiefly affects apple trees [ibid., 30, p. 233], but has also been observed in Holland in pear and cherry. It occurs exclusively in localities where the phosphoric acid content of the soil is exceptionally high, the proportion of clay or humus unduly low (less than 20 per cent.), and lime is present in moderate to large quantities. In Holland and Denmark zinc deficiency symptoms have been induced on sandy soils by overdoses of phosphoric acid fertilizers. In Holland the disorder is confined to orchards on sand dunes and clay marine deposits in the provinces of Zeeland, North Holland, and Groningen, being absent from heavy river clay despite its much higher phosphoric acid content. The deficiency is easily remediable by spraying the trees in February with a 5 per cent. zinc sulphate solution or just before blooming with a mixture of 1·5 per cent. zinc sulphate and 0·75 per cent. lime.

Kastendieck (M.). **Rosettenkrankheit und Boden.** [Rosette disease and soil.]—*Phytopath. Z.*, 16, 4, pp. 511–512, 1950. [Received April, 1952.]

Observations in the western Palatinate, Germany, confirm those of Mulder in Holland [see preceding abstract] with regard to the connexion between soil constitution and zinc deficiency in fruit culture [*R.A.M.*, 28, p. 129]. Samples of a light sandy soil on which the trees are affected revealed a high pH (7·8) and a very high phosphoric acid content (69·7 and 75 mg. per 100 gm. dry soil at depths of 0 to 20 and 20 to 30 cm., respectively), consequent on heavy fertilizing with basic slag of recent years.

Delitala (A.). **Una nuova specie di Phialophora (Ph. goidanichii) agente di marciume in Mele immagazzinate.** [A new species of *Phialophora* (*P. goidanichii*) causing rot in stored Apples.]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 249–257, 1 pl., 3 figs., 1 graph, 1952. [English summary.]

Apples of the Abbondanza variety obtained from cold storage at Ferrara bore rather large, subcircular, pale brown spots with a distinct edge and a markedly concave centre. Even in the most advanced stages of infection the tissues remained very consistent, with no laceration of the epicarp. In the infected material was a fungus with flask-shaped conidiophores differentiated singly in an apical or lateral position, the apical measuring 15 to 25 by 2·5 to 3·5 (average 21 by 3) μ and the lateral 9·2 to 14·4 by 2·5 to 3·5 (11·8 by 3) μ. The apices of the phialides were conspicuously enlarged, and seen from the front they appeared to have two beaks. The hyaline, straight conidia, ogival at the extremities and generally slightly

constricted in the middle, measured 4 to 7·2 (average 5·4) by approximately 2 μ. The brown chlamydospores, shaped like a cocoon or a long shoe, were markedly constricted in the middle and appeared only in an apical position, either singly or more often in groups of four to ten, joined by a distal, lateral appendage. They measured 7 to 11·8 by 4 to 4·8 (average 9·7 by 4·3) μ. The fungus is named *Phialophora goidanichii* n.sp.

Inoculations of wounded apples with pure cultures of the fungus gave rise to typical symptoms. Spread of infection was very slow; in a damp chamber at laboratory temperature the lesions measured 5 mm. in diameter on the eighth day, 7 on the 12th, and 20 on the 18th.

Blumer (S.). **Das Auftreten des Apfelmehltaus und seine Bekämpfung im Jahre 1951.** [The occurrence of Apple mildew and its control in the year 1951.]—*Schweiz. Z. Obst- u. Weinb.*, 60, 26, pp. 501–505, 1 fig., 1951.

Great difficulties are presented by the control of apple mildew [*Podosphaera leucotricha*: *R.A.M.*, 31, p. 290], which assumed a virulent form in Switzerland [ibid., 30, p. 600; 31, p. 148] in 1951 notwithstanding the cool, damp spring weather usually regarded as unfavourable to the spread of the disease. At the Wädenswil Experiment Station, Zürich, the best control was obtained with a combination of summer pruning, infected branches being cut back as far as sound wood on 12th June, 1950, and six applications (four pre- and two post-blossom) of wettable sulphur B plus 0·2 per cent. spreader. This treatment reduced the incidence of mildew from 5·5 to 1·5 per cent. on Gravenstein pyramids, the corresponding figures for wettable sulphur A and lime-sulphur plus copper being 2·8 and 3·6 per cent., respectively. Wettable sulphur A reduced the incidence of infection on Gravenstein standards from 29·8 to 9 per cent., B to 10·8, and lime-sulphur plus copper to 19·5. Boiken trees pruned only on 25th October, 1950, failed to respond to fungicidal treatment in 1951, while the reduction of infection on entirely unpruned Landsbergers was incommensurate with the expense of spraying.

Togliani (F.). **Contributo alla conoscenza di uno Sferossidale del genere Peyronellaea.** [A contribution to the knowledge of a Sphaeropsid of the genus *Peyronellaea*.]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 81–94, 7 figs., 1952. [English summary.]

A description is given of the morphological and biological characters of a fungus causing papery bark canker and leaf and fruit spot of apple and other fruit trees in Italy, originally described by Goidànich as *Peyronellaea veronenis*, but later referred by him to *P. glomerata*, type species of the genus [see above, p. 492]. Latin diagnoses of the genus and of the type species, not previously presented, are given. The fungus (syn. includes *Coniothyrium glomeratum* [*R.A.M.* 16, p. 106], *Phoma glomerata* [ibid., 25, p. 527; 26, p. 357], *P. alternariaceum* [loc. cit.], and *P. richardiae* [ibid., 27, p. 238]), has round, often isodiametrical, sometimes flask-shaped or lenticular, light brown, later dark brown to almost black pycnidia average 120 to 170 μ in diameter, with a range of 30 to 180 by 60 to 200 μ; ostiole conspicuous. The unicellular conidia measure 6·7 by 3·4, generally 4·5 to 7 by 2·4 to 4·8 μ. The chlamydospores in chains of three to eight elements are clavate to sub-cylindrical or cuneate, and average 30 to 35 μ in diameter.

Gentilucci (T.). **Il Coryneum foliicolum Fuck. quale agente di 'marciume del cuore' delle Mele in Italia.** [*Coryneum foliicola* Fuck. causing heart rot of Apples in Italy.]—*Ann. Sper. agr.*, N.S., 5, 6, pp. 1295–1308, 9 figs., 1 graph, 1951. [English summary.]

During recent years some cases of heart rot of apple fruits caused by *Coryneum foliicola* [*R.A.M.*, cf. 1, p. 25; 27, p. 241; 30, p. 615] have been observed in the

province of Emilia, this being the first record for Italy. The author reviews the phytopathological significance of the fungus with the aid of the literature and describes the morphological and biological characteristics under both natural and artificial conditions. In inoculation experiments with pure cultures of *C. foliicola*, healthy Imperatore and Commercio apples developed a rot identical in appearance with that in nature, although it was not centred around the seed cavity.

Unless the attack is serious no addition to the normal spraying programme is considered necessary. Rotted fruit should be destroyed and storage conditions improved.

Pasqui (G.) & Ricci (P.). **Ricerche su la possibilità e la convenienza dell' istituzione di stazioni d'avviso contro la ticchiolatura del Melo (Venturia inaequalis) in Romagna.** [Studies on the possibility and the advantages of instituting warning stations against Apple scab (*Venturia inaequalis*) in Romagna.]—*Ann. Sper. agr.*, N.S., 5, 6, pp. 1309–1321, 1 graph, 1951. [English summary.]

Four types of experiment were investigated with a view to determining the practical advantages of establishing a system of warning stations for the control of apple scab (*Venturia inaequalis*) [cf. *R.A.M.*, 31, p. 334] in Romagna, Italy. Slide spore traps in the orchards and following the course of perithecial maturity in the laboratory both proved unquestionably that it is possible to follow this process and forecast the period of ascospore discharge in the air so that growers may be given timely spray warnings.

Wade (G. C.). **Black spot of Apples. Results of investigations in 1949–50 and 1950–51 seasons.**—*Tasm. J. Agric.*, 22, 4, pp. 293–303, 3 figs., 1951.

In the 1950–1 trials with ground fungicides for the control of apple black spot [scab] (*Venturia inaequalis*) [*R.A.M.*, 30, p. 177; 31, p. 20] in Tasmania a spray in late August of dinoc (active ingredient sodium DNC), at the rate of 400 gals. ½ per cent. solution plus 4 oz. 'emulsil' per 100 gals. per acre, reduced subsequent fruit infection in five orchards out of eight.

The percentages of fruit scab for different foundation sprays consisting of two applications of Bordeaux mixture (6–6–40 at early green tip and 3–2–4 at cluster stage) or of cuprolane (copper oxychloride) 1 lb. in 40 gals., or single green tip applications of Bordeaux mixture, cuprolane, or phygon (1 lb. in 80 gals.), all treatments being followed by lime-sulphur then colloidal sulphur, were 5·3, 9, 4·5, 12·1, and 9·8, respectively.

For the later applications (pink, calyx, and four cover sprays), following Bordeaux, a complete schedule of phygon gave outstanding control in 1949–50 both on leaves (29 lesions on 300 leaves) and fruit (94 per cent. clean fruit), followed by 2½ per cent. thiram (147 and 87 per cent.) and 1½ in 80 fermate (215 and 86 per cent.), the figures for the lime-sulphur and colloidal sulphur schedules being 104 to 331 and 58 to 78 per cent. In 1950–1 the first two treatments were of copper oxychloride. Leaf infection was so light that differences between the later treatments were not apparent. Phygon, thiram, and fermate again gave the lowest fruit infection (0·16, 0·15, and 0·22 per cent., respectively), though some of the sulphur schedules gave nearly as good control, while crag C (1½ pt. in 100) gave 0·39 per cent. infection. Russeting assessments showed that thiram caused least fruit damage, with fermate a good second. Colloidal sulphur caused less russet than lime-sulphur (1 in 80 gals.) and also gave better control (1·5 per cent. infection) of powdery mildew [*Podosphaera leucotricha*: ibid., 30, p. 177] than any of the newer fungicides, lime-sulphur being intermediate (2·8 per cent.). The calyx stage appears a critical period for fruit injury by sprays.

Kienholz (J. R.) & Childs (L.). **Pear scab in Oregon.**—*Tech. Bull. Ore. agric. Exp. Sta.* 21, 31 pp., 8 figs., 3 graphs, 1951. [Received 1952.]

A full account is given in popular terms of the symptoms, causal organism, and control of pear scab (*Venturia pirina*) [*R.A.M.*, 26, p. 112; 29, p. 264; 31, p. 189]. In Oregon scab causes a more consistent loss of crop than any other disease of pears [ibid., 25, p. 68]; in seasons favouring infection fruit losses of 20 to 30 per cent. are not uncommon, often reaching 80 to 90 per cent. where control practices are neglected. The disease is common in western Oregon, occasionally severe in the Hood River and Rogue River valleys, but rare in the drier, eastern regions. From 1944, when ferbam or ziram began to replace wettable sulphur in scab control [ibid., 27, p. 481], until 1950 Anjou pear production increased in the Hood River Valley by an estimated average of 300,000 boxes per year.

Experimental evidence showed that pear scab in storage originates as field infections before harvesting [cf. ibid., 17, p. 117]; new infections do not occur on the fruit after picking. Visible lesions enlarge only slightly in storage.

Adam (D. B.), Grace (J.), & Flentje (N. T.). **The 'gummosis' or 'dieback' disease of Apricots.**—*J. Dep. Agric. S. Aust.*, 55, 9, pp. 450–455, 7 figs., 1952.

In this progress report on gummosis or die-back of apricot trees in South Australia and Tasmania, usually associated with *Cytosporina* sp. [*R.A.M.*, 28, p. 406; 30, p. 522], the authors recapitulate the history, symptoms, spread, and control [ibid., 25, pp. 347, 508], and emphasize the importance of reducing the number of large pruning cuts, and of adequately destroying all prunings and debris, even from healthy trees, within six months at the latest.

Foster (H. H.) & Petersen (D. H.). **The Peach leaf curl epidemic of 1951.**—*Plant Dis. Reptr*, 36, 4, pp. 140–141, 1952. [Multilithed.]

The first epidemic of leaf curl (*Taphrina deformans*) [*R.A.M.*, 28, p. 446; C.M.I. map No. 192] for several years was observed in the peach areas of northern South Carolina during 1951, especially in Upper Piedmont. Some orchards, mostly of the Elberta variety, were nearly defoliated and fruit drop was extremely heavy. Of 73 varieties, rated on a scale of 0 to 5 in ascending susceptibility, none was immune but the following five to six-year-old trees were the most resistant (rated 0 to 1 or 1): Newday, Golden Beauty, Dixigem, Southern Glow, Redhaven, Missouri, Loring, Ozark, Prairie Dawn, and Davidson Red Leaf. Of the two- to three-year-olds, Indian Blood (Cling), Fay Elberta, Summer Crest, Fort Valley 20, Triogem, Merrill June, Raritan Rose, Early Red Fre, Early Jubilee, Cherryred, and Desirable were resistant. In both age groups Early Vedette, South Haven 20, and Redcrest were resistant. In some varieties the younger trees showed less pronounced foliage symptoms than the older.

Milbrath (J. A.). **The prevalence of ring spot virus in a latent condition in Cherries.**—*Plant Dis. Reptr*, 36, 4, pp. 137–139, 1952. [Multilithed.]

At the Oregon Agricultural Experiment Station, Corvallis, two buds each from selected cherry trees with dark green foliage showing no virus-like mottle or break were indexed on Shirofugen flowering cherry [*R.A.M.*, 30, p. 329] for ring spot [ibid., 31, p. 336]. If both buds gave no reaction five buds were taken from various parts of the tree and tested again on the same variety. If these proved negative the tree was then indexed on Kwanzan; a negative reaction on this indicated that the tree was free from known strains of the virus. Two varieties of flowering cherry were used because some mild strains of ring spot do not give the necrotic local

lesion reaction on Shirofugen but produce severe leaf curl in Kwanzan. Thus, several Napoleon (Royal Anne) trees appeared virus-free on Shirofugen but gave a strong reaction on Kwanzan. Of the 122 Napoleon trees indexed only one failed to react on either indicator. Ten trees of Late Duke and ten of May Duke gave no reaction. Bing trees free from ring spot were found quite frequently but all Lamberts tested reacted on both indicators and all Black Tartarian and Black Republican on one or both. Nearly one-third of the Montmorency trees indexed were virus-free. Cherry varieties from many different sources, indexed on Shirofugen for ring spot and partially screened for other serious viruses by grafting on Bing, are to be tested for resistance to little cherry [ibid., 30, p. 376] and albino virus diseases [ibid., 28, p. 408].

These studies showed the presence of ring spot in cherry varieties from the following countries or states: Italy, Germany, Australia, Poland, Morocco, England, France, Switzerland, Canada, California, and New York. Many varieties were virus-free when they were imported and the percentage of ring spot in them is still much lower than in American stocks.

Blumer (S.) & Geering (J.). **Das Kirschbaumsterben im Baselland (Pfeffingerkrankheit).** [The dying-off of Cherry trees in the region of Basel (Pfeffinger disease).]—*Phytopath. Z.*, 16, 3, pp. 300–335, 10 figs., 7 graphs, 1950. [English summary. Received April, 1952.]

This is a valuable summary of essential information, based on personal observations and a survey of 21 papers on the subject, on the graft-transmissible Pfeffinger virus disease of cherries in Switzerland [*R.A.M.*, 31, p. 245], where the principal centre lies towards the south and south-east of Basel [ibid., 26, p. 305]. The disease also affects wild cherries. The primary, secondary, and non-specific symptoms comprising the pathological complex may be masked on well-manured plants or by high summer temperatures. No correlation could be established between the distribution of the disease and the physical and chemical properties of the soil of the kind of fertilizer applied. Possibilities of control are discussed [ibid., 30, p. 48; 31, p. 245], particular importance being attached to the regular inspection of orchards (twice a year for the present, in May and late summer) for new outbreaks both in the main areas of infection and in isolated new centres.

Blumer (S.). **Die Bekämpfung der Sprühfleckenkrankheit an Kirschbäumen (Cylindrosporium padi).** [The control of the sparkling spot disease on Cherry trees (*Cylindrosporium padi*).]—*Schweiz. Z. Obst- u. Weinb.*, 60, 26, pp. 505–507, 2 figs., 1951.

In Switzerland the causal organism of cherry leaf spot, *Coccomyces hiemalis*, is known only in the imperfect state (*Cylindrosporium padi*) [*R.A.M.*, 31, p. 67]. Of recent years the disease has been fairly prevalent [cf. next abstract] in the nursery of the Wädenswil (Zürich) Research Station, and in 1950 and 1951 experiments on its control were carried out on eight vegetatively propagated understocks. Wettable sulphur and carbamate M 555 were used in both years, the spraying dates in the former being 13th June and 14th and 31st August, and in the latter 2nd and 13th August and 5th September; in 1951 an unnamed preparation, designated X, was also applied.

The average percentages of infection in 1950 in the wettable sulphur, M 555, and untreated plots were 19, 7, and 26, respectively, and in 1951, 28, 41, and 59, respectively, with 19 for X. The understocks reacted very divergently to infection by the leaf spot, 21 and 3684 being highly susceptible and F12/1 and F2/2 from East Malling fairly resistant in both years, while the behaviour of 4690 and 4845 was inconsistent.

Richter. **Stärkeres Auftreten einer Blattfleckenkrankheit an Kirschen verursacht durch den Pilz Coccomyces hiemalis Higg.** [Heavy incidence of Cherry leaf spot disease caused by the fungus *Coccomyces hiemalis* Higg.].—*Pflanzenschutz*, 4, 1, p. 7, 3 figs., 1952.

The exceptional prevalence of *Coccomyces hiemalis* on cherries in Germany in 1951 [cf. preceding abstract] is attributed to the high atmospheric humidity in June and July. The disease was responsible for appreciable damage in nurseries, where the shoots of affected trees failed to attain their normal annual increment. Infection started on sour cherries and subsequently spread to the sweet varieties.

Winter (H. F.). **Lime sulfur and ferbam sprays give control of Raspberry anthracnose.**—*Fm Home Res.*, 36, 273, pp. 83, 92–93, 1 fig., 1951. [Received 1952.]

During 1951 extensive spraying tests against raspberry anthracnose [*Elsinoe veneta: R.A.M.*, 31, p. 438], carried out in three widely separated black raspberry plantings near Cincinnati and at Wooster, Ohio, produced similar results. At Hamilton County farm, near Cincinnati, following liquid lime-sulphur (8 in 100) at the delayed dormant stage (buds with $\frac{1}{2}$ in. of green) and ferbam (2 lb. per 100 gals.) at pre- and post-bloom, there were (on 20th July) an average of 1·6 spots per cane; lime-sulphur followed by ferbam (1 lb.) plus phygon ($\frac{1}{2}$ lb.) gave 2·3, or by manzate (2 lb.) 2·9, or by orthocide 406 (2 lb.) 2·1, as against 79·3 spots per unsprayed cane. In the unsprayed plots and those given only lime-sulphur many laterals and some canes were so severely infected as to be unlikely to fruit at all the following year. It was estimated that the average unsprayed plant in these tests would not give more than 30 per cent. of a crop in 1952. The new recommendations for raspberry anthracnose control in Ohio [ibid., 17, p. 447] are: liquid lime-sulphur (8 in 100) at delayed dormant, ferbam (2 lb. per 100 gals.) at pre-bloom, and at post-bloom two weeks later.

Fitzpatrick (R. E.) & Mellor (Frances C.). **Studies of virus diseases of Strawberries in British Columbia. I. The reaction of the British Sovereign variety and the indicator Fragaria vesca to yellows.**—*Canad. J. Bot.*, 29, 3, pp. 182–188, 2 pl., 1951. [Received 1952.]

British Sovereign, the commercial strawberry variety of British Columbia, which originated as a chance seedling in the Fraser Valley, has shown no field evidence of degeneration from the virus disease yellows that attacks the Marshall variety in the Pacific Northwest [see next abstract]. Experimental inoculation of British Sovereign by stolon grafting [*R.A.M.*, 31, p. 441] to a yellows-infected Marshall plant showed, however, that it is susceptible to the disease and may be expected to degenerate if the virus becomes established in the stock. As with Marshall, infected plants were reduced in size and the foliage tended to flatten towards the ground, but unlike Marshall there was no pronounced yellowing. When *Fragaria vesca* was grafted to a yellow edge-infected Marshall plant the reaction was rapid and severe [cf. ibid., 30, p. 619 and next abstract]. The older leaves flattened to the ground, the young runner tips hooked back, the young leaves, although relatively well-proportioned, were minute and yellow at the margins, and the plants eventually died.

Mellor (Frances C.) & Fitzpatrick (R. E.). **Studies of virus diseases of Strawberries in British Columbia. II. The separation of the component viruses of yellows.**—*Canad. J. Bot.*, 29, 4, pp. 411–420, 4 pl., 1 fig., 1951. [Received 1952.]

Progressive transfers of *Capitophorus fragaefolii* [*C. fragariae*] from Marshall strawberry plants infected with yellows virus on the Pacific Coast of Canada [see preceding abstract] through a succession of *Fragaria vesca* plants resulted in the separation of at least two component viruses [cf. *R.A.M.*, 31, p. 338]. One, of the

non-persistent type, caused reduction in leaf size, mottle, crinkle, and leaf distortion, but the severity and dominance of these symptoms varied so widely that the component itself is assumed to be a complex of viruses or strains. It produced no visible symptoms on British Sovereign but this stock was found later to be carrying a latent virus of the non-persistent type. The principal effect of the other component, which was of the persistent type, was to reduce the vigour of the plant, though there was some leaf-cupping and, in the autumn under greenhouse conditions, a transitory yellow mottling of the tips and margins of some of the younger leaves. The two components were combined in *F. vesca* and produced yellows, so that the disease appears to be analogous if not identical with the British yellow-edge.

CABRAL (R. V. DE G.). **Notas sobre o 'Gloeosporium olivarum' Alm. III. Ensaios de tratamento. IV. Influência dos ataques do G. olivarum Alm., do Fusarium sp. e do Dacus oleae Gmel. no rendimento e qualidade do azeite.** [Notes on *Gloeosporium olivarum* Alm. III. Experiments in treatment. IV. Influence of the attacks of *G. olivarum* Alm., *Fusarium* sp., and *Dacus oleae* Gmel. on the yield and quality of the oil.]—*Bot. Jta nac. Azeite*, 4, 15, 16 pp.; 16, 16 pp., 1949. [French summaries. Received July, 1952.]

Two series of experiments in the control of *Gloeosporium olivarum* on Galega olive trees at the National Agronomic Station, Sacavem, Portugal [*R.A.M.*, 29, p. 267], were carried out in 1941. The first, consisting of a preventive treatment with 1 per cent. neutral Bordeaux mixture plus 2 per cent. aderol wetter at the inception of ripening, resulted in a reduction of infection from 13·5 to 3·1 per cent. At the same time the incidence of *Fusarium* [? *microphlyctis*: loc. cit.] was reduced from 9·4 to 3·1 per cent.

In the second series of tests, a preventive treatment with 1 per cent. Bordeaux mixture plus 1 per cent. novemol wetter was followed by the inoculation of the leaves and young branches with fresh spore suspensions of *G. olivarum*. Other trees were first inoculated and then sprayed. The preventive treatment was successful, reducing the number of diseased olives to negligible proportions, but once infection became established it was no longer possible to effect a cure.

Qualitative and quantitative analyses were made of diseased and healthy olives. Infection covering a third or less of the fruit surface increased the oleic acid content by 6·7 to 8·1 gm. per 100 fruits, while a more severe attack gave 11·7 to 18·7 gm. increase. The corresponding figures for *F.* (*?*) *microphlyctis* were 4·3 to 7·7 and 9 to 14·7 gm., respectively. The reduction in oil yield due to *G. olivarum* was computed at 19·2 per cent.

GOVI (G.). **La cercosporiosi o 'piombatura' dell' Olivo.** [Cercosporiosis or 'silver leaf' of Olive.]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 69–80, 2 pl. (1 col.), 3 figs., 1952. [English summary.]

Studies carried out in Italy since 1947 on silver leaf disease (*Cercospora cladosporioides*) [*R.A.M.*, 18, p. 604] of olive using material from Latium and Umbria, showed that in Italy the fungus has not yet been recorded on the fruits [cf. ibid., 23, p. 349]. The elongated, cylindrical conidia are rounded at the extremities and in some the lower third is bent back, so that they present a heel-shaped appearance. Others are undulating, arcuate, serpentine, nail-shaped, squat, or elongated. They have a double wall and two to seven transverse septa sometimes at different angles and there the spore is markedly constricted. Generally, one or two septa are more conspicuous than the others. The spores measure 28 to 71 by 2·7 to 5·5 (average 44·4 by 4·5) μ. Some of the hyphae on the leaf surface give rise to sclerotia measuring 9 to 12 by 4·5 to 5·5 μ. On agar media growth is very slow.

The active vegetative phase may continue uninterruptedly in areas where the climatic conditions are favourable, as in central Italy and on hillsides. When, however, environmental conditions are unfavourable the sclerotial bodies form; these give rise to mycelium with conidia. Special treatment for the control of silver leaf is not usually needed, as the methods used against *Cycloconium oleaginum* [ibid., 10, p. 130; 31, p. 25] are adequate.

Singh (B.) & Paharia (K. D.). **Damping-off of Papaya (Carica papaya L.) seedlings.**—*Sci. & Cult.*, 17, 11, pp. 477–479, 2 figs., 1952.

Damping-off of papaw seedlings [*R.A.M.*, 26, p. 536] was observed for the first time in June, July, and August, 1949 and 1950, in nurseries at the Botanical Garden of the Government Agricultural College, Kanpur, and subsequently in different parts of Uttar Pradesh, India. At Kanpur the extent of the damage varied from 10 to 65 per cent., becoming negligible with the advent of the cold season. Isolations from diseased seedlings yielded cultures of *Pythium aphanidermatum* [ibid., 30, p. 446] and *Rhizoctonia* [*Corticium*] *solani*. Their pathogenicity was tested by sowing papaw seeds in autoclaved inoculated soil. *P. aphanidermatum* caused greater post-emergence loss, while *C. solani* was mainly responsible for pre-emergence damage. With both fungi together losses up to 93 per cent. were sustained. Both fungi were reisolated from affected seedlings.

In statistically designed experiments ceresan [ibid., 31, p. 153], phygon [ibid., 29, p. 312], and agrosan GN gave the most effective control of pre-emergence damping-off, in that order, while agrosan GN was the most effective against post-emergence damping-off, followed by phygon. Of various soil treatments formaldehyde dust [ibid., 30, p. 211] used at the rate of 24 gm. per sq. ft. gave the best control of both organisms.

Pettinari (Carla). **Una fusariosi su radici di Opuntia ficus-indica.** [A fusariosis of the roots of *Opuntia ficus-indica*.]—*Ann. Sper. agr.*, N.S., 5, 6, pp. 1415–1421, 2 figs., 1 graph, 1951. [English summary.]

In spring, 1950, the roots of specimens of *Opuntia ficus-indica* from Catania, Sicily, were affected by a rot characterized by red discoloration of the diseased tissues, while the aerial parts of the plant withered and died. The disease, which was reproduced experimentally, was caused by a *Fusarium* sp. [*R.A.M.*, 25, p. 524; 27, p. 495] agreeing morphologically and biologically with *F. oxysporum* var. *opuntiarum* [*Amer. J. Bot.*, 27, 2, pp. 64–67, 1940]. This appears to be the first record of a root rot induced by *Fusarium* in *O. ficus-indica*. Preventive control measures consist of good soil management and drainage.

Brieskorn (C. H.). **Über die Einflussnahme einiger neuzeitlicher Schädlings- und Unkrautbekämpfungsmittel auf unsere Lebensmittel.** [On the influence exerted by some modern pesticides and herbicides on our foodstuffs.]—*Z. Lebensmitt-Untersuch.*, 93, 5, pp. 292–297, 1951.

Neither the mercury alkyl compounds, such as fusariol, ceresan, and germisan, nor the quinones, e.g., spergon and phygon, are deleterious to the health of man or livestock in the concentrations normally used for cereal seed disinfection [cf. *R.A.M.*, 14, p. 707; 27, p. 317; 31, p. 428], but care is needed in the feeding of poultry on grain treated with preparations of the former group.

Schwaebel (F. X.) & Obermayer (G.). **Nachweis von kupferhaltigem Spritzbelag auf Pflanzen.** [Demonstration of copper-containing spray residue on plants.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, 3, 11, pp. 167–168, 2 figs., 1951.

The residues left on the foliage of plants sprayed with copper-containing 'mists' for the control of fungal diseases are barely visible with the naked eye and studies

on their density and extent are facilitated by the application of a colorimetric method [cf. *R.A.M.*, 31, p. 80]. The leaf is laid on a soft paper pad with the treated side upwards. The 'copying paper' (the smoothest possible filter paper) is dipped in a 5 per cent. potassium iodide solution in acetic acid and evenly pressed down over the whole leaf surface with the fingers. The paper is then withdrawn and some starch powder evenly distributed over it with a camel's hair brush before drying. The copper residue will appear dark brown to blackish. This procedure gave very satisfactory results in tests on vine leaves at the Wacker Electrochemical Industry Company, Munich, and potassium iodide was found to be a preferable reagent to potassium ferrocyanide for the object in view.

Schmidt (H.). **Laborschnelltest zur Fungizidprüfung.** [A rapid laboratory test for the assay of fungicides.]—*NachrBl. dtsch. PflSchDienst., Berl.*, N.F., 5, 11, pp. 208–212, 2 figs., 1951.

Full details are given of the writer's simple laboratory test for the assay of fungicides [see next abstract], based on the inoculation with *Septoria apii* of the primary leaves of celery on filter paper in Petri dishes after prophylactic treatment with a spray or dust. Within a fortnight the efficiency of a given fungicide in the partial or total control of the pathogen may be assessed by comparison with an untreated series of inoculated leaves. The fungus is cultured on oatmeal agar, on which it sporulates freely.

Schmidt (H.). **Vorläufige Mitteilung über die fungizide Wirksamkeit E-mittelhaltiger Mischbrühen.** [Preliminary note on the fungicidal efficacy of mixed liquors containing E preparations.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, 12, pp. 224–226, 1951.

Using the rapid laboratory method for the assay of fungicides, with *Septoria apii* as the test fungus [see preceding abstract], mixtures of 1 per cent. each of cupral and fuclasin F [*R.A.M.*, 29, p. 37] with the insecticide E-30/51 were found to be efficacious and they induced no phytotoxic effects on a number of ornamentals. Less satisfactory were combinations of cupral and fuclasin with 0·2 or 0·3 per cent. wofatox spray, the suspensibility of the mixtures being adversely affected and their action on the test plants deleterious.

Hansen (K.). **Maskiner for afsvampning of såkorn og for sprøjtning og pudring af planter.** [Machines for the fungicidal treatment of cereal seed and for the spraying and dusting of plants.]—*Nord. JordbrForskn., 1951*, 2–3, pp. 519–521, 1951.

Information is presented in this paper, read before the eighth congress of the Scandinavian Agricultural Research Workers' Association held in Helsinki in June, 1950, on up-to-date developments in Denmark in the manufacture and application of equipment for seed treatment and the spraying and dusting of crops, including the use of aircraft [cf. *R.A.M.*, 31, p. 444].

Newton (W.). **Plant pathology in Canada.**—*Canad. phytopath. Soc. News*, 4, 1, pp. 3–6, 1951. [Mimeographed.]

Speaking at the Annual Meeting of the Canadian Phytopathological Society, Winnipeg, June, 1951, in his presidential address the author briefly reviewed the means for protecting the plant world of Canada. In view of the increased trade and improved and more rapid transport conditions, previous barriers against the spread of plant diseases now cease to be effective. For virus diseases in particular the inspection of living plant material at point of entrance into Canada becomes less effective every day, and field certification at the point of origin is rapidly becoming

more important. The international aspect of plant breeding for disease resistance and the plant diseases present in other parts of the world, therefore, can no longer be ignored.

As a result of the intimate co-operation between American and Canadian plant pathologists, certificates of freedom from virus diseases based upon field inspection at point of origin often accompany nursery stock from the United States.

A committee of the Canadian Phytopathological Society is suggested to investigate the status of plant disease diagnosis in Canada, to establish a source of stock plants or seed of test plants, and to construct simple keys based upon test plant reactions to assist pathologists in the recognition of new forms or races of common pathogens. This might be easier if certain genetically identical test plants were adopted by all Canadian pathologists. The best example of this is provided by the British wild strawberry, *Fragaria vesca* [see above, p. 499], which is of inestimable value to pathologists.

Langeron (M.) & Vanbreuseghem (R.). **Précis de mycologie.** [A compendium of mycology.]—703 pp., 1 pl., 461 figs., Paris, Masson et Cie, 1952. Fr 4800, (Fr 5400 bound).

This second edition of Langeron's work [*R.A.M.*, 25, p. 363], revised and enlarged by R. Vanbreuseghem, is divided into three parts. The first (pp. 3–363), covering general mycology, brings together, with considerable rearrangement and some additions, chapters one to seven, ten, and eleven of the old work; the second part (pp. 367–447) is the original chapter eight dealing with techniques but includes methods introduced since 1945; the third part (pp. 453–668), dealing with medical mycology, is written wholly by R. Vanbreuseghem and is entirely new. It replaces the original chapter nine and comprises 17 chapters covering the mycoses in alphabetical order of their common names. In this part the author has endeavoured to include everything essential, animal mycology being dealt with as fully as possible.

Quintanilha (A.) & Pinto-Lopes (J.). **Aperçu sur l'état actuel de nos connaissances concernant la 'conduite sexuelle' des espèces d'Hyménomycètes.** 1. [A review of our current knowledge of the 'sexual behaviour' of some species of Hymenomycetes. 1.]—*Bol. Soc. broteria.*, Sér. 2, 24, pp. 115–290, 1950.

The authors review the history of sexuality in the Hymenomycetes [*R.A.M.*, 28, p. 298] with the aid of the literature and present an alphabetical, tabulated list of about 300 species with entries for family, homo- or heterothallic, bi- or tetrapolar, with or without clamps, and the author. The specific names used in the original studies are retained but synonyms are inserted for reference. Brief notes are also given on the sexual behaviour of each species according to the authors cited, together with full titles of papers and, in many cases, additional comments and explanations.

Viennot-Bourgin (G.). **Étude morphologique de quelques lésions charbonneuses des végétaux.** [A morphological study of some smut lesions of plants.]—*Ann. Épiphyt.*, 2, 3–4, pp. 456–478, 4 figs., 1951.

The author describes and discusses, on the basis of his own work and from the literature, the general characters of the deformations produced in plants by the Ustilaginales; gall production or local traumatism, causing only negligible modifications in the vegetative part of the host; and generalized traumatism, producing nanism or giantism. The morphological changes that occur in the host as infection develops and a new species, *Sorosporium loudetiae*, in the flowers of *Loudetia* sp. are described.

Kelly (C. D.), Pady (S. M.), & Polunin (N.). **Aerobiological sampling methods from aircraft.**—*Canad. J. Bot.*, 29, 3, pp. 206–214, 2 pl., 1 diag., 1951. [Received 1952.]

The following three methods for sampling airborne bacteria and fungi from aircraft [cf. *R.A.M.*, 20, p. 316 and next abstract] flying at about 200 m.p.h. are described. The first is a qualitative method using a sampling tube to hold a Petri dish 12 in. in front of the aircraft nose, yet permitting loading and unloading from the interior. With the second and third methods, which are quantitative, the samplers are located inside the aircraft, air being brought to them by a rubber hose connected to 1 in. aluminium elbows in a side window. By the second method, employing a General Electric Electrostatic Bacterial Air Sampler in an aluminium sampling chamber 18 by 18 by 18 in., the organisms are precipitated directly on to an agar surface. Silicone slides (*Science*, 110, p. 187, 1949) were substituted for agar in the Petri dishes for studying the numbers of fungus spores. The third method utilized filters made from glass wool and lens paper disks mounted in brass hose couplings. The filters were shaken in sterile water and aliquot portions cultured in agar plates. In both quantitative methods the numbers of organisms were calculated on a cubic foot basis from the colonies which developed.

The number of fungus spores trapped on silicone slides during a flight over Montreal in June, 1949, was many times greater than the corresponding number of colonies on agar plates. When slide and filter were exposed simultaneously, the number of spores was 180·2 per cu. ft. and the number of colonies 10·2 per cu. ft.

Pady (S. M.). **Fungi isolated from Arctic air in 1947.**—*Canad. J. Bot.*, 29, 1, pp. 46–56, 1 pl., 1951. [Received 1952.]

This final assessment of the 208 cultures obtained from 51 agar plates exposed during four arctic and sub-arctic survey flights in 1947 [cf. *R.A.M.*, 31, p. 28 and preceding abstract] includes 55 non-sporulating organisms, 33 (15·8 per cent.) *Cladosporium*, mostly *C. herbarum* (previously referred to *Hormodendron* [cf. ibid., 28, p. 133]), *Streptomyces* 23 (11 per cent.), *Sporormia* 17 (8·1), *Penicillium* 13 (6·2), *Pullularia* 11 (5·4), *Verticillium* 7 (3·2), *Stemphylium* 6 (2·7), *Phoma* 4 (1·8), two each of *Botrytis*, *Alternaria*, *Phialophora*, and yeast, and single cultures of *Cephalosporium*, *Chaetomium*, *Fusarium*, *Gliocladium*, *Papularia*, *Pestalotia*, and *Sphaeronema*. With the possible exception of *Sporormia* the fungi are considered to be largely saprophytic soil-borne organisms carried to the Arctic by southerly winds.

Blank (F.). **A quantitative method for the in vitro assay of fungistatic agents.**—*Canad. J. med. Sci.*, 30, 2, pp. 113–117, 1 pl., 1952.

A simple method for the *in vitro* assay of fungistatic agents is described. Plates containing 20 ml. of the culture medium (2 per cent. difco neopeptone or peptone bactériologique 'uclaf', 4 per cent. maltose 'wander', 0·1 per cent. difco yeast extract, 10 per cent. bovine serum, and 2·5 per cent. agar in tap water) are used. A sterile filter-paper strip is dipped into a solution of the test compound, dried, and laid across the centre of the dish. Strips dipped in the solvent only serve as controls. For ointments thin cardboard strips are used. The dishes are incubated at 37° C. for about 16 hours, and inoculated next day with streaks of inoculum from the edge of the dish to the strip. Four different strains or species, streaked 2 cm. apart, can be tested on one dish. The dishes are again incubated at 30°, and the size of the inhibition zones is measured by the distance apart of the two corresponding fungus streaks on either side of the filter paper strip.

Hall (L. A.). **Ethylene oxide process reduces spoilage organisms.**—*Food Pack.*, 32, 12, pp. 26–28, 47, 2 figs., 1951.

A tabulated account is given of the excellent results obtained in the destruction

of spoilage organisms, including [unspecified] yeasts and moulds, in canned spices, various kinds of flour [see next abstract], and edible colloidal gums, by impregnation with ethylene oxide [cf. *R.A.M.*, 29, p. 269; 30, pp. 4, 608] after preliminary exposure to a safe heat under vacuum. The method is applicable to many other powdered food products, the microbiological spoilage of which has for some time been a recognized problem in the canning industry. The storage of such products at relatively high temperatures, e.g., 120° to 130° F., which is often the case with Army rations in the field, involves a strong risk of spoilage of this type.

Gattani (M. L.). **The quantitative determination of moulds in Sweet Potato and Wheat flours.**—*Indian Phytopath.*, 3, 2, pp. 148–152, 1951.

Eight samples of sweet potato flour, wheat flour [*R.A.M.*, 31, p. 345], and of the two mixed were found at the Indian Agricultural Research Institute, New Delhi, to contain rich flora of *Rhizopus* and *Aspergillus* spp. [cf. ibid., 19, p. 528; 25, p. 517], the highest counts of *Rhizopus* colonies being obtained on acid dextrose agar and of *Aspergillus* on potato dextrose agar containing 3 mols. of sodium chloride; on the latter medium *Rhizopus* was entirely suppressed. The commonest *A.* spp. were *A. niger*, *A. glaucus*, and *A. candidus*.

Ghosh (J. J.). **The effect of environmental factors on the fungal deterioration of stored Rice grains.**—*Sci. & Cult.*, 17, 1, pp. 42–43, 1951. [Received August, 1952.]

Studies at the University College of Science and Technology, Calcutta, on the effect of environmental factors on the development of rice-inhabiting fungi in storage [see next abstract] have shown that the rate of fungal development depends more on the relative humidity of the storage atmosphere than on the moisture content of the material stored, being fairly rapid on all samples of rice exposed to between 100 and 65 per cent. relative humidity and at temperatures from 30° C. upwards. At equivalent moisture contents parboiled rice moulded more readily than sun dried, but once the grains were infected further growth was more rapid on the latter and on undermilled. At 40° mould growth proceeded remarkably rapidly, more particularly on home-pounded or undermilled than on finely polished. In individual studies *Aspergillus* spp. in general showed best growth between 30° and 35°, both on Czapek's and rice decoction agars, while the *Penicillium* spp., particularly *P. luteum* and *P. frequentans* [loc. cit.], showed a preference for lower temperatures (about 25°). Optimum temperatures for the *Mucor* and *Fusarium* spp. were about 30° and near 35°, respectively, and for the *Cladosporium* and *Alternaria* spp. from 22° to 25°.

Ghosh (J. J.). **Studies on the nutritional requirements of Rice-inhabiting fungi.**—*Sci. & Cult.*, 17, 3, pp. 135–136, 1951. [Received August, 1952.]

In further studies on rice-inhabiting fungi [see preceding abstract] 12 different species selected for their high dextrinase, amylase, protease, and lipase activities were able to use a variety of carbon and nitrogen sources, rice glutelin as sole nitrogen source giving moderate growth of all the fungi tested. Different vitamins of the B-group influenced the growth of *Penicillium* species only, thiamin, nicotinic acid, biotin, and folic acid having a remarkable effect on the growth of *P. luteum*, *P. purpurogenum*, and *P. frequentans*.

Garino-Canina (E.), Capris (N.), & Passera (U.). **Passito di caluso.** ['Passito di caluso' wine.]—*Ann. Sper. agr.*, N.S., 5, 6, pp. 1349–1374, 2 figs., 4 graphs, 1951. [English summary.]

Studies on the physiological processes concerned in the withering of Erbaluce grapes in the making of Passito di caluso wine under controlled environmental conditions demonstrated the need for the intervention of *Botrytis cinerea* [*R.A.M.*,

31, p. 167]. This was confirmed also by the presence of glycerin in the must, without which the wine loses many of its essential characteristics.

Wegener (W.) & Questel (R.). **Untersuchungen über die Ursache der Zerstörung von nativen Faserstoffen durch Mikroorganismen I, II, III und IV, V.** [Studies on the causes of destruction of native fibre materials by micro-organisms I, II, III and IV, V.]—*Melliand Textilber.*, 32, 5, pp. 346–349; 7, pp. 493–499; 9, pp. 670–674; 11, pp. 817–820; 3 figs., 3 diags., 5 graphs, 1951. [English, French, and Spanish summaries.]

In malt agar cultures of a large number of fungi used for the inoculation of cotton and linen samples in Germany, the time required for the conidia to reach maturity ranged from one day or a little longer to nine or ten days, among the species developing most rapidly being *Rhizopus niger* [? *R. nigricans* = *R. stolonifer*: *R.A.M.*, 29, p. 576], *Mucor spinosus*, *M. parvisporus*, and *M. flavus*, while slow growers were represented by *Aspergillus fumigatus* [ibid., 29, p. 483] and *Scopulariopsis repens*, and the rest were intermediate. Staining of the medium by *M. parvisporus* and *Sporotrichum spicatum* began after two days, the corresponding periods for *Penicillium bulliardum*, *P. nigricans*, *A. nidulans*, *A. clavatus*, *A. glaucus*, and *P. ramigenum* being 4, 4 to 9, 6, 7 to 13, 12 to 14, and 18, respectively. Perithecia were produced by *A. varians*, *A. nidulans*, and *P. commune* after 20, 18, and 15 days, respectively.

Fungi are less sensitive than bacteria to both acids and lyes, besides requiring somewhat less moisture, and therefore participate more actively in microbiological damage to textiles. As shown by comparative observations on mixed and pure cultures, the damage inflicted by the joint operation of two moulds is greater than that caused by either singly, since the excretions of one species may serve as nutriment for another.

Previous outstanding contributions to the literature (90) serve as a basis for a comprehensive discussion of textile fungi [ibid., 31, p. 394], which are divided into three groups, comprising (1) species inhabiting finished materials (starch-consumers), (2) those merely continuing the retting process, and (3) cellulose-destroyers, attacking the fibre itself. Particularly severe damage is inflicted by degenerate forms of textile-inhabiting fungi.

Goldthwait (C. F.), Buras (E. M.), & Cooper (A. S.). **Chemical substitution in fibrous Cotton and resistance of substituted Cotton to microbiological deterioration.**—*Text. Res. (J.)*, 21, 11, pp. 831–840, 1951.

Studies at the Southern Regional Research Laboratory, New Orleans, Louisiana, are described which led to the conclusion that the resistance to [unspecified] microbiological deterioration of suitably acetylated fibrous cottons buried in soil for 6 to 12 months, some having only one-third of the hydroxyl groups substituted, depends on the distribution of the acetyl groups as well as on their total number.

Under the usual conditions of acetylation, according to the relevant literature, reaction takes place initially in the amorphous cellulose, starting at the most accessible places. In the writers' experimental acetylations and special dyeing tests (the latter designed to supplement other evidence regarding substitution and the composition and properties of substituted cottons), it occurred along fibres in various segments and throughout cross sections rather than as a layer increasing in thickness from the surface inwards. At one-third substitution the amorphous cellulose is converted to triacetate; the cotton fibre still contains about two-thirds of the original cellulose, which is present as crystalline material surrounded by acetylated cellulose. The swelling capacity of the cotton in water (evidently a more important factor in microbiological infection than is commonly recognized) is substantially reduced.

Microbiological invasion apparently begins at the most readily accessible amorphous cellulose. Protection by partial acetylation is attributed to the blocking of hydroxyl groups, the filling of spaces between chains in the amorphous cellulose, and the suppression of swelling. It represents a general method of rendering cellulose unsuitable, or at any rate inaccessible, as a food for micro-organisms. A relatively low degree of partial saponification may detract materially from the rot-resistance of a well protected acetylated cotton owing to the restoration of amorphous cellulose, accompanied by the loss of blocking groups and a resumption of swelling capacity.

Partial methylenation by treatment with formaldehyde may impart a moderate degree of rot resistance, very likely due to the suppression of swelling by cross-linking. Thus, cotton containing 1·3 to 1·4 per cent. combined formaldehyde retained 80 and 50 per cent. of its strength after three and five weeks, respectively, of soil burial, whereas the strength of untreated samples was completely lost in a week. Formaldehyde-containing resins apparently act in the same way as formaldehyde itself.

Ruggieri (S.). **Fungal requirements in Government specifications.**—*Paint Varn. Prod.* (*Mgr*), 41, 11, pp. 16–23, 56, 1951.

During the second world war the fungistatic coatings used in the early stages for preventing deterioration of electronic equipment [*R.A.M.*, 31, p. 29] were gradually replaced to a large extent by 'funginert' (inherently fungus-resistant) materials. Early in 1952 the Alaka Research Laboratories, Lacquer and Chemical Corporation, Brooklyn, New York, were contracted by the Bureau of Ordnance, Department of the Navy, to conduct research and development in the field of tropical deterioration. One of the objects of this programme is to determine, by culture and exposure tests, which materials are fungus resistant, while another phase is concerned with various aspects of tropicalization in relation to Government specifications. A list is given of the specifications relating to fungal deterioration in force at present, but since they are subject to daily alteration, the issue of periodical supplements and revisions is contemplated. In addition to the above-mentioned methods of testing, the soil burial procedure is also applied, mostly as a performance evaluation.

Coppock (J. B. M.) & Cookson (E. D.). **The effect of humidity on mould growth on constructional materials.**—*J. Sci. Fd Agric.*, 2, 12, pp. 534–537, 1 fig., 1951.

In a study at the Baking Industries Research Station, Chorley Wood, Herts., samples of wood (natural white deal and painted surfaces), hardened paint, plastered and distempered wood, and brick (natural and whitewashed, cement-rendered, and white), previously sterilized at 120° C. for three hours, were inoculated with the common bakery moulds, *Aspergillus niger*, *A. glaucus*, *Mucor plumbeus*, and *Penicillium* sp., natural air-borne contamination being simulated by blowing about 0·001 gm. of a 'dry' spore suspension on to the surfaces by a gentle blast of sterile air. The samples, supported on wire-mesh racks over a series of glycerol solutions giving a controlled humidity, were placed in sealed bell jars and incubated in a constant-temperature room at 27° for 28 days.

At or below a relative humidity of 70 per cent. mould growth was completely inhibited. On natural wooden surfaces there was an apparent optimum for fungal development at a range of 80 to 88 per cent. Growth on painted surfaces [*R.A.M.*, 31, p. 396] was moderate at 80 per cent. but increased consistently at the higher values up to 95 per cent. No growth occurred on hardened paint throughout the experimental range. On plastered wood [ibid., 31, p. 198] a moderate growth was reached at 80 to 88 per cent., above which there was no further increase. Distempered wood supported very slight growth at 80 and 88 per cent. On natural

brick surfaces mould growth was mostly very heavy to prolific at 88 per cent., decreasing above and below that level, while on whitewashed and white brick it became increasingly abundant up to 95 per cent. Only slight development occurred on cement-rendered brick throughout the humidity range.

PAVLIK (M.). **Studies in the pH regulation by the fungous mycelium of Fusarium scirpi Lamb. et Fautr.**—*Phytopath. Z.*, 16, 3, pp. 336–358, 1 fig., 6 graphs, 1950. [German summary. Received April, 1952.]

The pH regulation of the environment by bacterial and fungal metabolism is regarded as a complex phenomenon consisting of two distinct processes, one concerned with ionic exchange and designated 'ionic' regulation and the other with the chemical changes involved in the metabolism of the organism, or 'metabolic' regulation. At the Masaryk University, Brno, Czechoslovakia, the author sought to establish a relationship between these two processes by the culture (for up to 6 days at 23° C.) of five-day-old mycelium of *Fusarium scirpi*, isolated from greenhouse soil [*R.A.M.*, 13, p. 593], in nutrient solutions of varying glucose-peptone (Armour USP) ratios and adjusted to different acidity levels. The final acidity of the nutrient solution was then measured and the isometabolic point (the pH value at which no change in acidity took place) established. The mycelial mats were then washed in distilled water, divided into eight equal portions by a specially designed cutting instrument and put for one hour into buffer solutions adjusted to eight different pH levels. The initial and final values were plotted to give 'regulation' curves from which the 'regulation' point (the value at which there was no change in acidity) was determined.

By this means the hypothesis of Sideris [ibid., 8, p. 623] was confirmed, i.e., that the isometabolic point of a nutrient medium depends on its carbohydrate-protein ratio, the critical levels for 1 per cent. glucose with the addition of 0, 0·5, 1, 1·5, and 2 per cent. peptone being pH 3, 3·6, 4·2, 6·7, and 7, respectively. Grown in a solution without peptone the mycelium tends to regulate 'ionically' towards a pH value independent of the initial acidity of the solution, i.e., pH 6·6, to which, therefore, the isoelectric point of the mycelial protoplasm probably approximates. With mycelia grown in peptone-containing solutions the pH value towards which 'ionic' regulation is directed depends on the initial acidity of the medium, and the curves obtained are suggestive of those expressing pH changes in the nutrient solutions. This is explained by an assumption that surface-active amino compounds resulting from peptone decomposition are firmly adsorbed on the cell surfaces and participate in the mechanism of 'ionic' regulation, thus influencing the locus of the regulation point. It is important to note that the pH near cell surfaces differs from that of the rest of the nutrient solution owing to the differing surface activities of the respective amino compounds.

CUTTER (V. M.). **The isolation of plant rusts upon artificial media and some speculations on the metabolism of obligate plant parasites.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 14, 2, pp. 103–108, 1951.

Hotson and Cutter's recent report on the isolation and culture of *Gymnosporangium juniperi-virginianae* on synthetic media [*R.A.M.*, 30, p. 594] has refocused attention on the problem of the specific metabolites derived by rusts from their hosts. Most of the later contributions to the relevant literature surveyed in the present discussion have been noticed from time to time in this *Review*.

CABRAL (R. V. DE G.). **Anastomoses miceliais. Seu valor no diagnóstico das poliporoses.** [Mycelial anastomoses. Their value in the diagnosis of polypores.]—*Bol. Soc. broteria.*, Sér. 2, 25, pp. 291–362, 1 pl., 6 figs., 1951. [English summary.]

In order to assess the value of pairing diploid mycelia [see above, p. 503] as a

method for the identification of wood-rotting Polyporaceae, the author carried out some 800 matings between 41 strains (of which 23 were Portuguese) of 21 species of Polyporaceae [*R.A.M.*, 31, p. 92], using Robak's method [ibid., 25, p. 146] with certain modifications. Plain agar was the most satisfactory medium for the majority of the species investigated.

In pairings of diplonts compatibility was observed exclusively among strains of the same species irrespective of origin (country or host). However, anastomoses did not invariably develop even within the same species, e.g., *Polyporus sulphureus* and *Ungulina ochroleuca* [*P. ochroleucus*], so that negative results do not necessarily connote a specific difference. The method is considered to be particularly useful in the identification of easily confused species [cf. ibid., 31, p. 353], such as *Leptoporus* [*P.*] *adustus* and *L. imberbis* [*P. alligatus*]. *Lenzites betulina* and its ssp. *flaccida* sometimes regarded as distinct, were found to be perfectly compatible and should be referred, therefore, to the same species. In the pairings of *L.* [*Daedalea*] *quercina*, *Xanthocrous* [*P.*] *hispidus*, *Ganoderma lucidum*, and *G. resinaceum* no definite conclusion as to the authenticity of the anastomoses could be reached.

The capacity for intraspecific anastomosis varies with the species, being greater, for instance, in *L. betulina* and its ssp. *flaccida*, *Coriolus* [*Polystictus*] *versicolor*, *C.* [*Daedalea*] *unicolor*, *C.* [*P.*] *hirsutus*, and *X.* [*Fomes*] *pini* than in *G. applanatum*, *G. lucidum*, *G. resinaceum*, *Phellinus* [*F.*] *torulosus*, *P.* [*F.*] *fulvus*, and *Gyrophana* [*Merulius*] *lacrymans*.

A five-page bibliography is appended.

Richardson (L. T.) & Racicot (H. N.). **The comparative efficiency of tuber indexing and tuber unit planting in the elimination of virus diseases from seed Potatoes.**—*Amer. Potato J.*, 28, 11, pp. 765–775, 1 graph, 1 diag., 1951.

A five-year comparison, carried out from 1944 to 1948 at the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, showed that there was virtually no difference between tuber stocks of Certified Green Mountain potatoes indexed each year [cf. *R.A.M.*, 12, p. 49; 25, p. 204; 28, p. 537] and those unit-planted as to virus content in the first and second years, but in all subsequent years the amount of disease in the non-indexed exceeded that in the indexed stock. Both lots were carefully rogued each year. The virus diseases present were leaf roll [ibid., 31, p. 53], rugose mosaic (potato viruses X+Y) [ibid., 31, p. 293], and its current-season manifestation, leaf-drop streak [ibid., 29, p. 48], 'fern leaf' (1944 only), mild mosaic [? virus A: ibid., 31, p. 53], leaf-rolling mosaic [ibid., 19, p. 162], and bunch top or purple top [? a strain of aster yellows virus: ibid., 29, p. 328]. The average virus content of the indexed stock was 4·4 per cent., as against 12·4 per cent. for the non-indexed. The average infection (including current season) in a plot planted each year with healthy progeny was 1·1 per cent. There was no marked difference between the two methods as to degree of accuracy in detecting virus diseases. In general, mild mosaic was more readily detected in the greenhouse and leaf roll in the field. Both methods should be used for maximum efficiency, the main advantage of the former being that the purified stock was less subject to reinfection.

The outbreak of leaf-drop streak in 1948 was a striking example of the spread of a virus disease from primary infection centres [cf. ibid., 31, p. 313] and emphasized the importance of early roguing and the complete isolation of seed plots. The isolation strip between the indexed and non-indexed plots, though planted with maize, was ineffective in preventing spread. It is concluded that in general the tuber indexing has sufficient advantage over the tuber unit method in maintaining the purity of seed potato stock to justify the extra labour and cost entailed, particularly in regions where vectors of potato viruses are prevalent.

Bercks (R.). **Fortgeführte serologische Untersuchungen über das X-Virus in Kartoffelpflanzen.** [Further serological studies on the X-virus in Potato plants.]—*Phytopath. Z.*, 16, 4, pp. 491–507, 1950. [Received April, 1952.]

Primary field infection by potato virus X [see next abstract] in nine potato varieties, viz., Flava, Frühbote, Oberarnbacher Frühe, Böhms Mittelfrühe, Capella, Cornelia, Frühmölle, Frühperle, and Primula, was demonstrated by the leaflet method [*R.A.M.*, 31, p. 453] in further serological studies [cf. ibid., 30, p. 428] at the Brunswick branch of the Biological Institute in 1949. Inoculation at a relatively early date (18th to 27th May) generally resulted in the permeation of the entire plant. The Flava and Sabina strains of the virus multiplied more rapidly in Flava than the Erstling [Duke of York] strain. Because of possible exceptions, and especially on account of the incomplete penetration resulting from later inoculations, an average sample of every shoot of a plant is essential for the appraisal of its state of health.

In comparative tests on Duke of York the mean temperature of one greenhouse ranged from 6·7° to 13·7° C. and that of the other from 13° to 25°. Under the latter conditions the shoots of the rapidly growing plants reached a considerable size before the presence of the virus could be serologically demonstrated, whereas at the lower temperature it was detected from the onset in shoots of 2 to 5 cm. in length. In general, the pre-sprouting temperature (21°, 12°, or 5°) exerted little influence on the development of infection. The slight fluctuations in temperature occurring within the limits of normal planting times are of no significance in relation to the early diagnosis of potato virus X in the field. In tests in August and September, 1949, on Duke of York, Krebsfeste Kaiserkrone, Direktor Johanssen, Jubel, and Sabina the virus was shown to be present in some of the completely withered leaves.

Bercks (R.). **Über die Konservierung von Kartoffel-X-Virus durch Glycerin.** [On the conservation of Potato virus X with glycerin.]—*Phytopath. Z.*, 16, 4, pp. 508–510, 1950. [Received April, 1952.]

Experiments are described from the Brunswick branch of the Biological Institute in which solutions of potato virus X [see preceding abstract] supplemented by 40 to 60 per cent. glycerin retained their serological activity for at least a year both at 3° C. and room temperature, whereas those without a preservative were inactivated in a month or a week at the two temperatures, respectively. Moreover, the virus-glycerin mixtures were still infectious in tests on tobacco after a year.

Boock (O. J.) & Neto (J. E. P.). **Produtividade e composição mineral de diferentes variedades de Batatinha.** [Productivity and mineral composition of different Potato varieties.]—*Bragantia*, 10, 6, pp. 161–176, 1950. [English summary. Received May, 1952.]

Seed potatoes of ten varieties were imported from Holland in 1947 and investigated in replicated plantings in six localities of São Paulo, Brazil, from the standpoint of yield, earliness, disease and pest resistance, and mineral composition. Alpha and Voran showed a fair degree of resistance to blight (*Phytophthora infestans*) [*R.A.M.*, 28, p. 80; 31, pp. 78, 139], while Erstling [Duke of York], Saskia, and Doré were very susceptible. Hollow heart [ibid., 27, pp. 85, 153; 28, p. 235, *et passim*] was prevalent in Doré, and a high percentage of pulp spotting, commonly known as 'chocolate' and generally of physiological origin, occurred in Eigenheimer [see next abstract] and Alpha tubers. Saskia was very susceptible to scab (*Actinomyces scabies*) and rhizoctoniosis [*Corticium solani*: ibid., 28, p. 80], and Geelblom to spindle tuber virus [ibid., 30, pp. 534, 577].

Boock (O. J.). **Variedade de Batatinha 'Eigenheimer' (Solanum tuberosum L.).** [The Eigenheimer variety of Potato (*Solanum tuberosum* L.).]—*Bragantia*, 10, 12, pp. 371–382, 1 fig., 1950. [English summary. Received May, 1952.]

Further observations are recorded on various qualities of the Eigenheimer potato variety, including its reactions to several diseases, grown in 34 different localities in São Paulo, Brazil [see preceding abstract], from 1935 to 1940. It proved to be susceptible to virus diseases, blight (*Phytophthora infestans*), early blight (*Alternaria solani*) [*R.A.M.*, 28, p. 80], bacterial wilt (*Pseudomonas solanacearum*) [ibid., 28, p. 81], and scab (*Actinomyces scabies*).

De Carvalho (T.). **Um novo e violento ataque de míldio (Phytophthora infestans, de Bary).** [A new and violent attack of mildew (*Phytophthora infestans* de Bary).]—*Gaz. Agric., Moçambique*, 3, 30, pp. 282–284, 2 figs., 1951.

In July, 1950, a virulent outbreak of blight (*Phytophthora infestans*) occurred in Mozambique [*R.A.M.*, 31, p. 77] on potatoes and tomatoes, this being the first record of the pathogen on the latter host in the Colony. The symptoms of infection on tomato are briefly described and directions given for the control of the disease on both crops.

Gassner (G.) & Grimm (H.). **Über die Wirkung von Kupferkalkspritzungen auf Ertrag und Stärkegehalt der Kartoffeln.** [On the influence of copper-lime sprays on the yield and starch content of Potatoes.]—*Angew. Bot.*, 26, 2, pp. 60–68, 4 graphs, 1952.

At the Brunswick branch of the Biological Institute replicated experiments were carried out in 1951 to compare the tuber and starch yields per plant and the starch content of the dry matter of early Sieglinde and Cornelia, medium-late Heida, and late Wega potatoes in untreated half plots and those sprayed with 1 per cent. Bordeaux mixture at a dosage of 600 l. per ha. In the absence of blight (*Phytophthora infestans*) the calculated values in the sprayed halves of the plots were either equal to or rather below those in the untreated, except for the first two (July) starch content readings in the early varieties. After the onset of infection towards the end of August in the medium-late and late varieties the tuber and starch yields and starch contents of the sprayed plants were greater than for the untreated.

Recent claims that Bordeaux mixture exerts a stimulatory action even in the absence of blight, leading to an increased yield of 5 per cent. according to Hanf in *Biol. UnterrHefte*, Giessen, cannot be substantiated on the basis of these tests. On the contrary, there are many well-authenticated instances of crop reductions from Bordeaux sprays, which consequently should not be applied until the first symptoms of an outbreak become apparent.

Pohjakallio (O.). **Potatisens resistensfragor.** [Questions of resistance in the Potato.]—*Nord. JordbrForskn., 1951*, 2–3, pp. 486–493, 4 figs., 1951.

This paper, presented at the eighth congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950, contains an account of the experiments in progress at the Helsinki Phytopathological Institute for the development of combined resistance to frost and blight (*Phytophthora infestans*) in potatoes by crossing commercial varieties with *Solanum demissum* [*R.A.M.*, 31, pp. 138, 349]. This species maintained its resistance to *P. infestans* in all the laboratory and field tests undertaken in Finland between 1946 and 1949, and the F_1 hybrids also remained free from infection during the seasons of 1948 and 1949 except for a barely perceptible browning of the tubers.

Vanderwalle (R.). **Sur un cas d'attaque de gale poudreuse.** [On a case of attack by powdery scab.]—*Parasitica*, 8, 1, pp. 15–16, 1 pl., 1952.

Certain interspecific hybrids of *Solanum* cultivated at the Station de Recherche pour l'Amélioration de la Pomme de terre at Libramont, Belgium, developed numerous localized tumours on the thin rootlets as a result of attack by *Spongospora subterranea* [*R.A.M.*, 22, p. 403; 30, p. 340]. The tumours were very large in relation to the size of the rootlet. Intense cellular proliferation had occurred at a strictly localized point of infection and had induced a highly developed mass of undifferentiated tissue, the point of insertion of which appeared markedly constricted. The parasitized cells were not enlarged and each gave rise to only one sporulating plasmodium, which developed normally. It appeared that the fungus initially induced intense cellular multiplication at a distance, and then invaded the parenchymatous cells, thus behaving as a secondary invader.

MacLachlan (D. S.) & Thatcher (F. S.). **Studies in the nutrition of Corynebacterium sepedonicum (Spieck. and Kott.) Skapt. and Burkh.**—*Canad. J. Bot.*, 29, 3, pp. 246–259, 1 pl., 5 graphs, 1951. [Received 1952.]

A detailed investigation of the nutritional requirements of *Corynebacterium sepedonicum* [*R.A.M.*, 24, p. 336] at Macdonald College, McGill University, Quebec, and the Department of Agriculture, Ottawa, showed that pantothenic acid and a mixture of amino acids increased its growth. A new medium containing these ingredients is suggested for the isolation and maintenance of *C. sepedonicum*.

MacLachlan (D. S.) & Racicot (H. N.). **Some methods of used bag disinfection in Potato ring rot control.**—Reprinted from the Thirty-Second Annual Report of the Quebec Society for Plant Protection, 8 pp., 3 figs., 1950. [Received March, 1952.]

Some of this information on the control of potato ring rot (*Corynebacterium sepedonicum*) in used jute bags has already been noticed from another source [*R.A.M.*, 31, p. 53]. Two-inch squares of jute burlap were soaked in an aqueous suspension of the bacterium for 30 minutes, dried at room temperature, dipped in 1:100 dilutions of the quaternary ammonium compounds Ocean 101 (Ocean Chemicals, Ltd., Toronto) and R2L (G. H. Wood & Co., Toronto) and plated on a special medium. Ten and 12 minutes respectively in the disinfectants gave complete control. Similar squares were contaminated by rubbing with badly infected tubers or by soaking in a bacterial suspension, both lots being immersed in 1:100 Ocean 101. Ten minutes again sufficed to kill the bacteria in the soaked squares, but fifteen minutes were required for the rubbed squares, thus showing that the presence of organic matter decreases the bactericidal activity. One minute's exposure to infra-red lamps [loc. cit.] was sufficient to kill the bacteria in both single and double layers of jute contaminated as before, but seven minutes were required for jute squares when no warming period was allowed. In a final experiment squares inoculated with infected tuber material were placed between two whole bags and treated in the oven. The bacteria were killed only after at least three minutes' exposure and in most cases the strands were scorched.

It is concluded that 960 bags per hour could be disinfected if a single layer averaging 18 by 36 in. were passed crosswise through an infra-red oven 36 ft. long on a conveyor belt at a rate of 1 ft. per 2·5 seconds to effect the required exposure period of 90 seconds [loc. cit.].

Guha (M. P.). **Boron deficiency and its relation to tuber cracking of Potatoes.**—*Sci. & Cult.*, 17, 1, pp. 40–42, 3 figs., 1951.

Potato tuber cracking, observed on most of the varieties grown at the State Agricultural Research Institute, Calcutta, and particularly severe on Sebago, was

found to be due to boron deficiency [*R.A.M.*, 25, p. 362]. This was caused by over-liming which resulted from irrigating the soil, already containing sufficient lime, with tube-well water also very rich in lime. Tube-well water should be analysed before being used for irrigation.

WIANT (J. S.), FINDLEN (H.), & KAUFMAN (J.). **Effect of temperature on black spot in Long Island and Red River Valley Potatoes.**—*Amer. Potato J.*, 28, 11, pp. 753–765, 1 graph, 1951.

Experiments were carried out at the Bureau of Plant Industry, Soils, and Agricultural Engineering, Washington, on temperature in relation to potato internal black spot [cf. *R.A.M.*, 31, p. 31] resulting from mechanical bruising. With Green Mountain potatoes grown near Riverhead, Long Island, in the seasons from 1944 to 1949, and Triumph (Bliss Triumph) and Irish Cobbler grown near East Grand Forks, Minnesota, in 1949, the prevalence and severity of blackening was largely reduced by conditioning susceptible tubers for some days at temperatures above the normal storage range before bruising [cf. ibid., 25, p. 276]. A conditioning temperature range of 65° to 75° F. was most effective; complete control was not secured at any temperature. Green Mountain tubers needed a conditioning period of at least two to three days. A two-day exposure of Triumph and Irish Cobbler tubers, but not Green Mountain, to the higher temperature range after bruising reduced black spot. Continuous storage at temperatures above the normal storage range also reduced black spot after bruising.

The marked increase in the prevalence and severity of black spot caused by exposure of susceptible tubers before bruising to temperatures below the normal storage range suggests that where the condition is of potential importance grading or otherwise handling the potatoes while cold should be avoided. Though 33° was the lowest temperature employed in the tests the slope of the temperature curves indicates that black spot might be even more serious in potatoes bruised at temperatures between 33° and the freezing point of the tubers.

SÍK (K.). **Pedological investigation of the Rice-browning disease in Hungary in 1949.** —*Agrártud. egy.*, 2, pp. 409–422, 1950. [Abs. in *Soils & Fert.*, 15, 2, p. 145, 1952.]

In water cultures 25 mg. ferrous iron or 1 ml. saturated hydrogen sulphide water in 100 ml. produced the symptoms of rice browning disease in Hungary. It appeared sooner in the presence of both iron and hydrogen sulphide, larger amounts of iron, or more than 10 mg. manganese [*R.A.M.*, 26, p. 562]. Soils with a pH of about 7 in water or 5·5 to 6 in potassium chloride tended to cause browning. The hydrolytic activity of such soils was generally higher (above 10) than that of normal soils and the total nitrogen content was sometimes higher also. The possibility of the disease appearing is very great when the soil has a ferrous iron content exceeding 275 mg. or a total iron content exceeding 300 mg. per 100 gm. after thirty days' inundation. It occurred mainly in limeless alkaline soils containing sodium carbonate with latent acidity and a tendency towards reduction when inundated. It was never observed on black steppe loamy soils.

VOLLEMA (J. S.). **Over een tot dusver niet bekende wijze van optreden van de schimmel Ustulina maxima in Rubbertuinen.** [On a hitherto unknown mode of occurrence of the fungus *Ustulina maxima* in Rubber gardens.]—*Bergcultures*, 21, 2, pp. 20–21, 1952.

Ustulina maxima [*U. zonata*] has been observed in a hitherto unknown form on 23-year-old *Hevea* rubber bud grafts, as well as on full-grown trees, in south Banten, Java [*R.A.M.*, 21, p. 42]. Latex exudes from cortical swellings on the stem, ½ to

1 m. long, generally situated at a height of 3 to 6 m. from the ground and not infrequently at the fork of a branch. Sometimes the diseased bark is thrown off and spontaneous recovery ensues. Severely diseased trees should be eradicated.

Garrett (S. D.). **The soil fungi as a microcosm for ecologists.**—*Sci. Progr., Lond.*, 40, 159, pp. 436–450, 1952.

After pointing out that in the study of soil fungi [*R.A.M.*, 30, p. 626] two distinct streams of endeavour, which have now combined, are apparent, one due to mycologists interested in the fundamental problem of the life of fungi in the soil, the other to plant pathologists concerned with the control of fungi attacking the roots of crop plants, the author reviews and discusses the results so far obtained by each of these two groups of workers, i.e., by synecological studies (the study of whole fungal communities) and autecological studies (the study of individual root-infecting fungi, including mycorrhiza). The biological control of soil fungi by *Trichoderma viride* [cf. ibid., 30, p. 295; 31, p. 238, *et passim*] and the place of the different fungi in the ecological succession in relation to their type of nutrition are dealt with.

Miller (J. J.), Peers (D. J.), & Neal (R. W.). **A comparison of the effects of several concentrations of oxgall in platings of soil fungi.**—*Canad. J. Bot.*, 29, 1, pp. 26–31, 1 pl., 1951. [Received 1952.]

The effect of adding various concentrations of dehydrated bile to soil-extract agar and potato dextrose agar in platings of two Ontario soils was studied in the Department of Botany, McMaster University, Hamilton. The development of colonies of bacteria and actinomycetes was retarded by 1 to 2 per cent. ox gall [*R.A.M.*, 27, p. 82; 29, p. 433] but the number of fungus colonies was not decreased, though the spread and crowding of certain bacteria and fungi was lessened, thus facilitating the counting and isolation of individual fungus colonies.

Jones (H. T.). **Magnesium as a plant nutrient.**—*Chem. & Ind.* (*Rev.*), *1951*, 50, pp. 1108–1110, 1951.

In a series of experiments started in England in 1943 to compare the effect of derivates from magnesian limestone with derivates from other limestone it was found that the lowering of sugar beet and swede yields caused by excess of magnesium oxide is only temporary. The adverse effects of magnesian lime materialize only when excessive quantities are used. Notes are also given on the occurrence of magnesium deficiency.

Lal (K. N.) & Subba Rao (M. S.). **Role of manganese in crop production.**—*Sci. & Cult.*, 16, 12, pp. 553–558, 1951.

The role and the importance of manganese in crop production and its influence on growth and metabolism of plants are briefly reviewed chiefly from the literature (30 titles). A section is devoted to plant diseases caused by manganese deficiency in the soil [*R.A.M.*, 30, p. 246].

Ciccarone (A.). **Note fitopatologiche. II. Segnalazione italiana della Peronospora della Trigonella (Trigonella foenum-graecum L.).** [Phytopathological notes, II. Italian report of the *Peronospora* of *Trigonella* (*Trigonella foenum-graecum* L.).]—*Ann. Sper. agr.*, N.S., 6, 1, pp. 165–168, 1 fig., 1952. [English summary.]

During recent years *Trigonella foenum-graecum* growing near Scerni, in the province of Chieti, on the Adriatic coast of Italy, has been attacked with increasing severity by *Peronospora trigonella* [cf. *R.A.M.*, 12, p. 611; 22, p. 112], and as a result the area sown to this locally important forage crop is progressively diminishing.

The mature oospores, 30 to 45 μ, are a deep chestnut colour, with a densely reticulated epispore and areolae 2·5 to 7 μ [in diameter] and crests 2·5 to 3 μ. They were present in all the tissues of the mesophyll, but were most numerous in the lacunose tissue. This appears to be the first record of this fungus in Italy.

Muntañola (María). **Relaciones antagónicas entre 'Bacillus subtilis' (Cohn emend. Prazmowsky) y 'Helminthosporium sacchari' (van Breda de Haan) Butler.** [Antagonism between *Bacillus subtilis* (Cohn emend. Prazmowsky) and *Helminthosporium sacchari* (van Breda de Haan) Butler.]—*Lilloa*, 23, pp. 319–330, 4 figs., 1950. [German summary. Received May, 1952.]

Cultures of *Helminthosporium sacchari* isolated from sugar-cane seedlings at the National Experiment Station, Villa Alberdi, Tucumán, Argentina, on potato dextrose agar were contaminated by *Bacillus subtilis* [*R.A.M.*, 29, p. 298; 30, p. 482; 31, p. 395], the bacterial colonies remaining at a distance of up to 8 mm. from those of the fungus. The antagonism was studied experimentally by seeding the surface of agar plates with a bacterial suspension and inoculating the centre with *H. sacchari*. A transparent halo up to 1 cm. in diameter developed around the fungus. There was no antagonism towards other bacteria tested. The reaction is considered to be mutual between the two organisms, but more pronounced on the part of the bacterium.

Doidge (Ethel M.). **The South African fungi and lichens to the end of 1945.**—*Bothalia*, 5, 1094 pp., 11 pl. (1 col.), 11 maps (1 col.), 1950.

This monumental work, based on the 35 years of study by the author, assembles all the available information on the fungi and lichens which are known to occur in South Africa or in the sub-continent. Following seven short introductory sections dealing with the natural features of the area, history of the subject, local notes, and observations on type material, a list of the species in systematic order is given, with notes on occurrence and collections recorded. Complete host indexes (plant and animal) are provided and there is a statistical summary of the number of genera, species, and varieties recorded in each fungus family and group. A locality index, a bibliography (pp. 995–1032), and lists of collectors' and authors' names and abbreviations are also included.

Vasil'evsky (N. I.) & Karakulin (B. P.). Паразитные несовершенные грибы. Часть II. Меланкониальные. [Parasitic imperfect fungi. Part II. Melanconiales.]—680 pp., 150 figs., Moscow and Leningrad, Academy of Sciences U.S.S.R., 1950. 47 roubles.

The first part of this work (Part I. Hyphomycetes) by the same authors was published in 1937. Both volumes include those fungi already found in the U.S.S.R. and those that are likely to be discovered on further mycological investigations. Also, for the benefit of the quarantine services certain foreign species are included. Information on the location of various species in the U.S.S.R. is based on the material obtained from the Botanical Institute and Pan-Soviet Institute for Plant Protection herbaria and free use was made of the contemporary data of both Russian and foreign mycological and phytopathological literature. A key to the genera is given and the larger genera have keys to the subsections, while the species and their keys are arranged under host families and genera, the former being in alphabetical order in accordance with the Flora of the U.S.S.R. or Engler's Pflanzenfamilien. The appendix includes Latin diagnoses of two new species, one new variety, and one new name, as well as Latin equivalents for certain Russian words and expressions. A bibliography of 57 titles and a host list are given. *Elsinoe fawcetti* [C.M.I. map No. 125] is recorded on citrus in all parts of the U.S.S.R., but

particularly in the Gruzian Republic; *Colletotrichum lindemuthianum* [ibid., No. 177] develops on beans (*Phaseolus vulgaris*) in the European part of the U.S.S.R., Siberia, and the Gruzian Republic in particular.

Gremmen (J.). **Enige belangrijke inoperculate Discomyceten van de Veluwe en de Veluwe-Zoom.** [Some important inoperculate Discomycetes from the Veluwe and the Veluwe-Zoom.]—*Fungus*, 21, 4, pp. 70–79, 2 figs., 1 map, 1951. [English summary.]

Of the 63 species of inoperculate Discomycetes collected between 1946 and 1951 in the sandy upland soils of the Veluwe and the low-lying fields and meadows bordering the Rhine in the Veluwe-Zoom, Holland, 28 are new to the Dutch microflora. Among the relatively few parasitic forms encountered were *Crumenula abietina* on pine (*Pinus nigra* var. *austriaca*), mostly in its imperfect state, *Brunchorstia destruens* [*R.A.M.*, 6, p. 706; cf. 15, p. 618; 28, p. 429]; *Dasyscypha* [*Trichoscyphella*] *willkommii* on larch stems [ibid., 18, p. 74]; *Lophodermium pinastri* on pine needles [ibid., 19, p. 178]; and *Pseudopeziza medicaginis* [C.M.I. map No. 129] and *P. trifolii* on lucerne and clover leaves, respectively.

Gremmen (J.). **A preliminary study on the culture of Discomycetes, especially the perfect stage.**—*Leeuwenhoek ned. Tijdschr.*, 18, 2, pp. 153–164, 2 pl., 1952.

Of 40 Discomycetes cultured *in vitro* from naturally ejected ascospores, six produced the perfect state, including *Cenangium ferruginosum* [*R.A.M.*, 25, p. 283] from pine branches, *Encoelia fascicularis* from branches of ash and poplar, *Pezicula cinnamomea* [ibid., 29, p. 536] from a twig of *Alnus incana*, *Phialea acuum* from pine needles, and *Sclerotinia sclerotiorum* from living bean plants [? *Phaseolus vulgaris*].

On cherry decoction agar and oatmeal agar the mycelium of *C. ferruginosum* was yellowish-green; after four weeks, black, pycnidia-like bodies oozed out, forming a brown to yellowish-brown liquid at maturity which contained numerous unicellular, hyaline, bacilliform cells measuring 3·5 to 4·5 by 1 to 1·5 μ. On wheat grains with pieces of pine branches fully mature apothecia developed in three months; the ascospores were identical with those of the original material.

On cherry decoction agar *Pezicula cinnamomea* formed a greyish mycelium with pale brown aerial hyphae. After a few transfers fully mature, orange-yellow apothecia formed in six months. The 2- to 4-celled ascospores measured 26 to 28 by 9 μ. The same dish also contained acervuli, the 1- to 5-celled spores of which measured 28 to 39 by 11 to 14 μ. The unicellular, hyaline, bacilliform microconidia measured 4 to 9 by 1·5 μ.

On potato dextrose agar *Phialea acuum* formed, after seven weeks, small black bodies containing unicellular, hyaline spores measuring approximately 7 to 8 by 4 μ and closely resembling those of *Phoma*; the delicate, white, sometimes cream-coloured apothecia had asci and ascospores measuring 20 to 30 by 4 μ and 4 by 2 μ, respectively.

The sclerotia of *S. sclerotiorum* [ibid., 31, p. 250], kept in tubes of water agar, fructified after five months.

Haworth (F.). **Distribution of copper containing dusts.**—*Tea Quart.*, 22, 3, pp. 118–120, 3 graphs, 1951.

Further experiments in Ceylon to determine the value of copper fungicides in controlling blister blight of tea [*Exobasidium vexans*: *R.A.M.*, 31, p. 461 and next abstracts] were carried out in a 680 ft. long tunnel at Talawakelle, through which a fairly steady 4 m.p.h. wind blew from south to north. Two pounds of each of thirteen proprietary dusts were blown from a Whirlwind dusting machine, placed

about ten yards inside the tunnel with the nozzle horizontal 6 ft. from the ground. Uniform glass plates (100 sq. cm.) were placed at intervals throughout the length of the tunnel directly in line with the nozzle. After the projection of the dust the tunnel was allowed to clear completely before the plates were collected and the amount of copper on each was determined by means of the standard sodium diethyldithiocarbamate colorimetric method.

The results indicated that for application by the large drift duster type of machine perelan containing 2, 4, or 8 per cent. copper as cuprous oxide and dusts containing 4 or 8 per cent. copper as oxychloride are of little use since they do not spread out very readily and would probably lead to very heavy but localized deposits. The probable effective range of the dusts used is about 200 to 250 ft., with the exception of cuprosana (6 per cent. copper as oxychloride) which has an effective range of about 350 ft. and an extreme limit of 450 ft. [loc. cit.].

Loos (C. A.). **Studies in blister blight control. VII. Power dusting with 'cuprosana' dusts containing 2, 4 and 6 per cent. of copper. VIII. Trials conducted with the 'micron' power sprayer in connection with the application of oil-based copper fungicides.**—*Tea Quart.*, 22, 4, pp. 126–132, 133–136, 1951.

In a further study in this series [cf. *R.A.M.*, 31, p. 355] the efficiency of the Whirlwind duster in distributing cuprosana dust and the effectiveness of dusts containing 2, 4, and 6 per cent. copper in controlling blister blight of tea [*Exobasidium vexans*: see preceding and next abstract] during the south-west monsoon were tested in a field on a hillside facing south-west on the upper Abbotsford Division of Dessford Group, Nanu Oya, Ceylon, at approximately 5,000 ft. From this site dust would carry for fairly long distances when a south-west wind prevailed. The experiment lasted from May to October, application rates being fixed at 5 lb. dust per acre at five-day intervals for reasons of general agricultural practice.

As the distance from the machine increased, sole dependence on the wind carrying the dust appeared to result in uneven distribution and a fall in the amount of copper deposited. Deposits were considerably lower 50 yds. from the machine than at 25 yds. At 100 yds. the copper deposits for all three concentrations were equally low. Throughout the experiment the copper residue 25 yards from the machine immediately after application never exceeded 194, 100, and 93 p.p.m., respectively.

Unfavourable conditions for disease development prevented any estimate of blister blight control being made.

During the 1951 south-west monsoon a prototype 'micron' sprayer, modified by the addition of a new type atomizer and a flexible delivery tube, was tested on tea in Ceylon for the low volume application of oil-based fungicides against blister blight. Of the products used, Clean Crops fungicide gave slight control of the disease from 0 to 5 yds., but copper naphthenate, bouisol, ialine, and cuproil caused scorching and leaf injury.

Thompson (A.) & Johnston (A.). **Blister blight of Tea in Malaya. I. Interim report on investigations 1950–1951.**—*Malay. agric. J.*, 34, 3, pp. 105–118, 5 pl., 2 graphs, 1951.

Since the first report of blister blight (*Exobasidium vexans*) [see preceding abstracts] on tea in Malaya [*R.A.M.*, 30, p. 509] the disease has spread to all estates and holdings in the Cameron Highlands, appearing on lowland properties in May, 1950. Here, however, outbreaks are sporadic and damage is slight. It occasionally affects tea grown almost at sea-level. Moisture, high humidity, and shade were the chief factors favouring the development of the fungus in the field. In the Cameron Highlands spore germination and leaf penetration occurred only when a film of

moisture was present on the young leaf for over eight hours. Preliminary inoculation experiments established that 12 days may elapse between infection and spore production [ibid., 31, p. 403]. Some bud infection was also observed in these experiments. Data obtained from a highland estate and from the Agricultural Station, Tanah Rata, Cameron Highlands, indicated that infection reached a peak in April and May, 1950, but declined from June to August, corresponding with a drier period with lower humidity and increased sunshine. Build-up began again in October, maximum infection being reached in December. There was a temporary improvement the following April, following drier conditions in March.

Experiments carried out on pruned tea from June, 1950, to May, 1951, demonstrated the excellent protection given by perenox (4 oz. in 10 gals. water), applied every seven days until the tea came into plucking. If general weather conditions are less favourable to the fungus, pruning may be undertaken safely at any time of the year except perhaps in September and October. Further extension of the disease may occur in lowland areas in the near future.

Fulton (R. W.). **Mutation in a Tobacco necrosis virus strain.**—*Phytopathology*, 42, 3, pp. 156–158, 1 fig., 1952.

In a joint investigation of the United States Department of Agriculture and the Wisconsin Agricultural Experiment Station on mutation in the tobacco necrosis virus [*R.A.M.*, 29, p. 539], red, necrotic spots resembling sectors developed at the margins of slowly spreading, white lesions on cowpea leaves inoculated with a single-lesion strain. From these spots were obtained, on subinoculation, strains producing only red, necrotic lesions. On leaves inoculated with a mixture of inoculum from red and white lesions, well-separated lesions of both colours appeared, the former before the latter. On the basis of these observations it is concluded that the red spots contained mutant virus.

All the 11 isolates forming white lesions on cowpea gave rise to red mutants. Of three strains studied in detail, the most unstable produced mutants about five times as frequently as the most stable. Many of the red mutants differed among themselves in the type of lesions they formed on cowpea. Reverse mutations from red to white lesion types were not observed.

Knight (C. A.). **The nucleic acids of some strains of Tobacco mosaic virus.**—*J. biol. Chem.*, 197, 1, pp. 241–249, 1952.

At the Virus Laboratory, University of California, Berkeley, nucleic acids were isolated from six recognized strains of tobacco mosaic virus (TMV, M, J14D1, GA, YA, and HR) [*R.A.M.*, 31, p. 355] and two provisional ones (CV3 and CV4) [ibid., 27, p. 162] and analysed for their purine and pyrimidine contents by paper chromatography and ultra-violet spectrophotometry. The molar proportions of the bases in the six recognized strains appear to be identical, but the nucleic acids of the two provisional strains contained decidedly less adenine and more uracil than the others. It is postulated that mutation of the virus is accompanied by a change in the composition of the protein, and conversely, that the nucleic acid remains essentially constant in composition throughout many mutations. On this basis, CV3 and CV4 (from cucumber) must be excluded from classification among the strains of tobacco mosaic virus, from which they differ significantly in their particle size and host range [ibid., 19, p. 668] as well as in nucleic acid values.

Hutton (E. M.). **An age-induced variation in susceptibility to virus X in Nicotiana tabacum L.**—*Aust. J. sci. Res.*, Ser. B., 4, 4, pp. 450–460, 1 pl., 1951.

Preliminary experiments at the Division of Plant Industry, Canberra, indicated clearly that young Kentucky 41A tobacco plants invariably became systemically

infected after inoculation of the tip leaves with [potato] virus X [see next abstract], whereas plants at or near the flowering stage seldom did. Even graft-inoculations did not give full systemic invasion of old plants. Another experiment showed that systemic invasion occurred in plants inoculated four weeks after transplanting, whereas of three plants inoculated eight weeks after transplanting one was readily invaded and in the other two systemic infection did not occur until 20 to 30 weeks after inoculation. No systemic infection occurred in plants inoculated 14, 19, and 26 weeks after transplanting. The evidence demonstrated that once systemic invasion by virus X has occurred in young plants, subsequent ageing does not affect their virus status, even under conditions of very low nutrition. Results with Turkish tobacco followed the same trend. The age-induced phenotypic variation in susceptibility to virus X appears to be common to all tobacco varieties, irrespective of the genotype. There was no indication that an inhibitor was responsible for the reduced susceptibility of old tobacco plants.

The results suggest that the introduction of virus X into young plants so affects their metabolism that the normal ageing changes become inoperative. In view of the phenotypic variation caused by increasing maturity, this factor should be taken into account when evaluating progenies in work on the genetics of virus resistance.

Köhler (E.). **Über die Bildung nekrotischer Zonen an virusinfizierten Tabakblättern. Zugleich ein Beitrag zur Frage der Virusbewegung im Blattparenchym.** [On the formation of necrotic zones on virus-infected Tobacco leaves, together with a contribution to the question of the virus movement in the leaf parenchyma.]—*Phytopath. Z.*, 17, 1, pp. 115–127, 11 figs., 1950. [Received April, 1952.]

Samsun tobacco leaves inoculated with strain Bf of potato virus X were used for a preliminary study of the laws governing the formation of necrotic zones in primary and secondary infections and the movement of the virus in the leaf parenchyma [*R.A.M.*, 28, p. 28 and preceding abstract]. On this basis the following theory is developed. The virus spreading in the leaf parenchyma from any focus of infection produces in the tissue at the periphery of its dispersion a zone of enhanced sensitivity, in which the cells perish on contact with certain stimuli of a nature as yet unknown. In this way a necrotic zone develops. Since the sensitivity zone advances *pari passu* with the dispersion of the virus, new necrotic zones may arise in a similar manner. Underlying this hypothesis is the assumption that the tissue in the path of the virus is only temporarily sensitive to the necrosis-inducing stimuli and later undergoes a reversion. The passage of virus from one parenchyma cell to another can be effected only by way of the plasmodesmata. It is suggested that it traverses these channels by a kind of contact synthesis rather than by diffusion.

Stover (R. H.). **Tobacco etch virus in Ontario.**—*Canad. J. Bot.*, 29, 3, pp. 235–245, 4 pl., 1951. [Received 1952.]

Inoculation tests with eight species of *Nicotiana*, 18 tobacco varieties, and several other hosts demonstrated that there are at least three distinct strains of the tobacco etch virus on tobacco in Ontario [see next abstract]. One strain, designated K because of its similarity to the Kentucky strain [*R.A.M.*, 7, p. 477; 30, p. 201], consistently induced characteristic etching on Burley varieties and Samsun and is believed to be similar to or identical with the severe etch described in the literature [ibid., 24, p. 401]. The tobacco varieties fell into two groups on the basis of their reaction to the etch virus: all Burley varieties developed severe symptoms; on flue-cured, dark, and cigar varieties they were mild. The former group inoculated

with strain N developed pronounced necrosis and with strain V pronounced vein-clearing, while in the latter group K produced faint vein-clearing and etching, N chlorosis and wilting of old leaves on mature plants, and V faint vein-banding. In *Datura stramonium* K produced vein-clearing and chlorotic mottle, N rugosity, and V mild chlorotic spot mottle which often became masked. On [chilli] pepper var. Penn Wonder symptoms were very variable, strain K producing first a dark green mottle and later on top leaves a chlorotic cast of small rings, and sunken ring spots on the fruit, although some plants showed only mild or masked mottle. With N the symptoms were masked or else no infection occurred, but old plants cut back sometimes produced mottled suckers with mild distortion. No symptoms were observed on plants inoculated with strain V.

The widespread occurrence of the virus is attributed to the prevalence of the vector *Myzus persicae* on tobacco. A mixture of a ring spot strain of potato virus X and etch caused a more severe disease on Burley tobacco than did either virus alone.

Stover (R. H.). **Association in Tobacco of the severe symptom response to etch virus and the white Burley character.**—*Phytopathology*, 41, 12, pp. 1125–1126, 1 fig., 1951.

To verify the supposition that the severe symptom response to a strain of tobacco etch virus at Harrow, Ontario, Canada [see preceding abstract], was associated with the low chlorophyll content of the white Burley types, two varieties of this group, Harrow Velvet and Halley's Special, were each crossed with a green flue-cured variety, Delcrest, and the progeny inoculated with severe etch virus. The entire F_1 population developed mild etch symptoms, and all the green F_2 plants (78 from the Harrow Velvet cross and 85 from the other) were more or less mildly affected while the seven and five white F_2 plants were extremely chlorotic. Two lots of segregating F_2 seedlings were etiolated by Henika's method (*J. agric. Res.*, 44, pp. 447–493, 1932) in order to determine the white Burley types, the chlorophyll deficiency associated with which becomes accentuated during the treatment. Selected seedlings of this type inoculated, after the resumption of normal growth, with the severe etch virus contracted severe symptoms, whereas green seedlings reacted to similar treatment by a milder form of the disease.

It is concluded that severe etch injury in Burley tobacco is linked with the recessive white Burley genes g_1g_2, while the presence of a dominant allelic gene modifies the severity, with a consequent reduction in foliar injury.

Raychaudhuri (S. P.). **Retention of Tobacco mosaic virus in Tomato seeds.**—Abs. in *Phytopathology*, 42, 2, p. 114, 1952.

Seeds obtained from tomatoes with symptoms of internal browning from two localities in New Jersey [*R.A.M.*, 30, p. 85] were germinated in the greenhouse at weekly intervals and extracts from the resultant seedlings tested on *Nicotiana glutinosa* for the presence of tobacco mosaic virus [cf. ibid., 17, p. 139]. Only seedlings raised from seed stored for a week were found to be infected by strains of the virus associated with internal browning. However, the ordinary strain of tobacco mosaic virus [cf. above, p. 518] was retained by stored seeds from tomatoes infected by internal browning for 27 days. Moreover, dry seeds from tomatoes with internal browning retained a small quantity of the virus externally for at least a fortnight.

Beach (W. S.). **Tomato spraying in Pennsylvania.**—*Bull. Pa agric. Exp. Sta.* 531, 32 pp., 7 figs., 2 graphs, 1950. [Received 1952.]

The results are given of six years' experiments on the control of late blight (*Phytophthora infestans*) [*R.A.M.*, 31, pp. 303, 406], early blight (*Alternaria solani*)

[ibid., 30, p. 437], and anthracnose (*Colletotrichum phomoides*) [ibid., 30, p. 493] of tomatoes in Pennsylvania [ibid., 29, p. 292]. Ziram gave the best and most consistent control of anthracnose, equivalent to 78 per cent. average reduction of fruit infection in Pennsylvania and 74·6 per cent. in trials at various co-operating State Experiment Stations, but was the least effective against late blight, and was relatively ineffective in preventing defoliation and fruit infection by early blight. Bordeaux mixture and tribasic copper sulphate (or fixed coppers) gave the best control of late blight, although three applications of ziram followed by two or more of tribasic copper sulphate gave equally good or even better yields of saleable fruit during severe late blight years, the average being 13·7 tons compared with 3·6 tons with no treatment.

Zineb [ibid., 31, p. 462] was especially effective against early blight and about 10 per cent. less effective than ziram against anthracnose. It was somewhat less effective than copper fungicides in the control of late blight when applied at ten-day intervals. Although fruit production was heavy on treated plants there was a high proportion of immature fruit.

Ciccarone (A.). **Note fitopatologiche. I. Importanza economica di un 'marciume basale' del frutto del Pomodoro in alcune aree campane.** [Phytopathological notes. I. Economic importance of a basal rot of Tomato fruits in some areas of Campania.]—*Ann. Sper. agr.*, N.S., 5, 6, pp. 1375–1378, 1 fig., 1951. [English summary.]

The author indicates the economic importance of an unexpectedly serious attack of stem-end or basal rot of tomato fruits caused by *Alternaria solani* [*R.A.M.*, 30, p. 634] and *A.* spp. of the *tenuis* type, which occurred during the summer of 1950 in the Naples area from Pompeii to Nocera and San Marzano under nutritional and agronomic conditions unfavourable to the host plant [loc. cit.].

Jacks (H.). **Tomato leaf mould—factors in control revealed by laboratory and glasshouse tests.**—Reprinted from *Orchard. N.Z.*, 24, 7, p. 23, 1951.

In laboratory tests at the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand, young Potentate tomato plants were inoculated with a spore suspension of the leaf mould fungus [*Cladosporium fulvum*: *R.A.M.*, 30, p. 20] either before or after sprays were applied, incubated for 24 hours at 90 per cent. relative humidity and a temperature of 70° F., and then kept in a greenhouse under similar conditions. The percentage control based on the number of lesions on two leaves (ten leaflets) was calculated as the percentage infection of the untreated checks. With plants inoculated before spraying, control obtained by shirlan A.G. (3 lb. in 400 gals. water) was between 45 and 79 per cent., and that by copper oxychloride (5 lb. to 100 gals.) or by shirlan plus copper oxychloride (3 lb. plus 2·5 lb. or 5 lb.) 39 to 71 per cent. Spraying before inoculation gave better control, shirlan giving 91 to 97 per cent., and copper oxychloride and combinations 82 to 94 per cent. control.

Tests were also conducted in three commercial glasshouses, two of which were adequately ventilated. In the first the disease was controlled by spraying with shirlan A.G. (3 in 100) [ibid., 22, p. 157] at intervals of 10 to 14 days from the time the plants were established. In the second greenhouse the plants were sprayed at three-week intervals after the appearance of leaf mould. Shirlan A.G., copper oxychloride (5 lb.), and shirlan (1·5 or 3 lb.) plus copper oxychloride (5 or 2·5 lb.) all gave moderate but inadequate control but increased yields compared with the unsprayed. Shirlan A.G. at 3 lb. gave better control and higher yields than the others. Inadequate control was secured in the third greenhouse, which was badly ventilated, despite the fact that spraying commenced as soon as the plants were established.

Jacks (H.). **Soil disinfection. XI. Control of foot-rot (Phytophthora cryptogea P. & L.) of Tomatoes.**—*N.Z.J. Sci. Tech.*, Sect. A, 33, 4, pp. 71–75, 1 fig., 1 diag., 1951.

Continuing his soil disinfection investigations in New Zealand [cf. *R.A.M.*, 31, p. 324] the author sought a method of controlling tomato foot rot (*Phytophthora cryptogea*) [ibid., 20, p. 501; 27, p. 111; 29, p. 540] in boxes without disinfecting the soil before planting out. Cultures of the fungus on sterilized tomato stems were macerated and mixed with equal weights of sterile sand, the mixture being added to soil partially sterilized by steam at the rate of 2 per cent. of soil weight. Aqueous solutions of 14 chemical products were applied at the rate of 3 pints per box five days after planting, the controls receiving an equal amount of water. Agral L (1·3 ml. per gal.) was added to all solutions. The presence of the fungus in diseased seedlings was assessed by isolations.

The results showed that 1 and 2 per cent. cuprox, 0·063 per cent. phygon, 0·25 per cent. formalin, 1 per cent. Cheshunt compound, and 0·063 per cent. puratized all gave satisfactory control and effectively prevented further spread of the disease without affecting plant growth. Thiram, ferbam, and ziram gave highly effective control, but caused severe stunting. The most satisfactory material tested was cuprox.

Govindan (P. R.). **Influence of boron on Tomato.**—*Sci. & Cult.*, 17, 12, pp. 519–520, 1952.

Studies at the Plant Physiological Laboratory, College of Agriculture, Banaras Hindu University, India, clearly indicated that the critical concentration of boron for the normal development of tomato plants [*R.A.M.*, 25, p. 522] lies between 2 and 3 p.p.m. At all other concentrations symptoms of either deficiency or toxicity develop.

Young (H. C.) & Bart (G. J.). **Oak wilt in Ohio. Aerial survey shows general infection in State's timber area.**—*Ohio Fm & Home Res.*, 36, 272, pp. 67–68, 71, 1 fig., 1 diag., 1 map, 1951.

Following the discovery of oak wilt [*Chalara quercina*: *R.A.M.*, 30, p. 494; 31, pp. 228, 408, and next abstracts] in Ohio in 1950 an extensive survey in 1951 aided by air reconnaissance revealed the disease in 15 eastern counties and in one in the north-west.

Kuntz (J. E.) & Riker (A. J.). **Oak wilt in Wisconsin.**—*Stencil Bull. Wis. agric. Exp. Sta.* 9, 8 pp., 1 fig., 1 diag., 2 maps, 1950. [Received 1952. Mimeoprinted.]

A list is given of oak species infected either naturally or by inoculation with *Chalara quercina* [*R.A.M.*, 29, p. 544 and preceding and next abstracts] in Wisconsin. Species newly found susceptible are chinquapin oak (*Quercus muehlenbergii*), swamp red oak (*Q. falcata* var. *pagodaefolia*), blackjack oak (*Q. marilandica*), chestnut oak (*Q. montana*), and live oak (*Q. virginiana*).

A description is given of the pathogen, the symptoms of the disease, and its spread. The disease is most severe in the central, southern, south-western, and western areas of the State. Removal of all diseased trees, whether dead, dying, or newly infected, has checked the spread of the disease which in one year has not crossed the trench barriers made between the healthy and diseased trees. A longer time is necessary, however, to determine the effectiveness of the trenching system.

Fowler (M. E.). **Oak wilt surveys in 1951.**—*Plant Dis. Reptr*, 36, 4, pp. 162–165, 2 maps, 1952. [Multilithed.]

Extensive surveys for oak wilt (*Chalara quercina*) [C.M.I. map No. 254; *R.A.M.*, 31, p. 306 and preceding abstracts] in 1951 revealed infections in many new counties

and in seven new States, including Virginia. Aeroplanes flying 200 to 500 ft. above the treetops have been used, with two observers surveying a ½-mile wide strip, while a third marks the position of infected trees on a map. Ground crews take specimens for confirmation when new infections are suspected. Control programmes are most likely to succeed if they are initiated while infection centres are small and not numerous. At present eradication is practicable in the Ozarks and Eastern States, but in several years' time the disease may be out of hand.

McCallum (A. W.) & Stewart (K. E.). **Dutch Elm disease.**—10 pp., 2 figs., Canada, Department of Agriculture, 1951. [Multilithed.]

A popular account is given of Dutch elm disease (*Ceratostomella ulmi*) [*R.A.M.*, 30, pp. 17, 635], its distribution in Canada [loc. cit.], symptoms, cause, and control. There is reasonable hope that the disease can be kept in check under Canadian conditions.

Müller-Stoll (W. R.) & Hartmann (Ursula). **Über den Cytospora-Krebs der Pappel (Valsa sordida Nitschke) und die Bedingungen für eine parasitäre Ausbreitung.** [On the *Cytospora* canker of Poplar (*Valsa sordida* Nitschke) and the conditions for an epidemic outbreak.]—*Phytopath. Z.*, 16, 4, pp. 443–478, 15 figs., 1 diag., 1950. [Received April, 1952.]

Following a brief survey of the literature on the canker of poplars, willows [*Salix*], and other trees caused by *Valsa sordida* [*R.A.M.*, 31, p. 354], mostly in its conidial state, the authors describe their exhaustive studies at the Forest Botany Institute, Tharandt, Dresden, which were prompted by an outbreak of the disease in a poplar nursery at Graupa, Saxony, during 1946 [ibid., 30, p. 495]. The culture of the fungus presented no difficulties, but only pycnidia developed. Branches, twigs, and young stems are rapidly killed by the fungus, the cortex being permeated and the xylem deeply penetrated. Canker-like lesions with typical zones of occlusion may develop round the sites of infection. Hitherto no economic importance has been attached to *V. sordida* in Germany, but it may well constitute a source of considerable damage in forest stands, especially of aspen (*Populus tremula*).

Infection proceeds exclusively from injuries or dead wood; in nurseries it invades mother stocks through wounds inflicted in the removal of the propagation wood. Infection tends to progress rapidly during the dormant period, when the moisture content of the cortex and wood are reduced; in the spring and summer it is frequently arrested temporarily. Resistance to *V. sordida* depends mainly on the vitality of the host [ibid., 10, p. 349], promoted in its turn by rational cultural practices; foremost among these is an ample water supply, especially for susceptible young trees, while other precautions should include the avoidance of injuries to the stems and branches and the exclusion of diseased material from nurseries. During the above-mentioned epiphytotic in Saxony virtual immunity from the canker was exhibited by *Populus eugenii*, *P. trichocarpa*, and *P. berolinensis*, even in close proximity to plots of *P. deltoides* with 50 to 80 per cent. infection. *P. robusta* and *P. vernirubens* showed moderate susceptibility, about a quarter of the population succumbing, while *P. bachelierii* was, in general, highly resistant. A remarkable feature of the mild recurrence of the disease in 1948 was its restriction to the two species, *P. trichocarpa* and *P. berolinensis*, which withstood the catastrophe of 1946. Evidently, therefore, variations in resistance at different times and under divergent conditions are to be anticipated.

A list is given of 11 other species of *Valsa* and five of *Cytospora* facultatively parasitic on various hosts, which also appear to be favoured by drought and other factors lowering the moisture content of the host tissue.

Dame (F.). **Zum Vorkommen des Walnuss-Bakterienbrandes, verursacht durch Pseudomonas juglandis Pierce.** [On the occurrence of Walnut bacterial blight caused by *Pseudomonas juglandis* Pierce.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, 3, 11, p. 164, 1 fig., 1951.

The agent of a severe outbreak of walnut blight involving three localities in the Herford district of Westphalia, Germany, in 1950 was identified in pure culture on small pieces of sterile potato as *Pseudomonas* [*Xanthomonas*] *juglandis* [*R.A.M.*, 31, p. 91].

Good (H. M.) & Nelson (C. D.). **A histological study of Sugar Maple decayed by Polyporus glomeratus Peck.**—*Canad. J. Bot.*, 29, 3, pp. 215–223, 2 pl., 1951. [Received 1952.]

The parenchyma cells in sugar maple [*Acer saccharum*] wood invaded by *Polyporus glomeratus* [*R.A.M.*, 26, p. 429] in Ontario were killed in advance of the spreading mycelium and their contents transformed into masses of dark brown wound gum. These, together with similar masses which formed occasionally in the vessels and fibres, imparted a characteristic dark colour to the outer part of the infected heartwood. The presence of wound gum appeared to inhibit decay development, possibly owing to the increase in pH with which it has been consistently associated. In tissues containing wound gum decay was limited to slight delignification of certain cells in the intervessel areas, but the tissues disintegrated rapidly following its disappearance. Variation in resistance to decay was related to variations in the reactions of the cell walls to several staining procedures.

Batista (A. C.). **'Cylindrocladium scoparium' Morgan 'var. brasiliensis' Batista e Ciferri, um novo fungo do Eucalipto.** [*Cylindrocladium scoparium* Morgan var. *brasiliensis* Batista & Ciferri, a new fungus on Eucalyptus.]—*Bol. Sec. Agric. Pernambuco*, 18, 3–4, pp. 188–191, 3 figs., 1951. [English summary.]

Cylindrocladium scoparium var. *brasiliensis* Batista & Ciferri n.var., responsible for a die-back of mature *Eucalyptus* trees in São Paulo, Brazil, as well as for the destructive damping-off already reported [*R.A.M.*, 22, p. 505], differs from the type species [ibid., 7, p. 508; cf. also 30, p. 346] in its conidial dimensions, averaging 23 to 39 by 3 to 5 μ [23 to 29 by 3 to 3·5 μ in the Latin diagnosis].

Spaulding (P.). **A stem rust of Pinus roxburghii in India potentially dangerous to the United States.**—*Plant Dis. Reptr*, 36, 4, pp. 159–161, 2 figs., 1952. [Multilithed.]

The author discusses the history and significance of the destructive stem rust of *Pinus longifolia* (*P. roxburghii*) in India caused by *Peridermium himalayense* [cf. *R.A.M.*, 20, p. 436] with the teleuto stage, *Cronartium himalayense* [loc. cit.] on *Swertia* spp. [ibid., 13, p. 340], and points out the possible danger of the disease to the 20 related species of hard pine comprising nearly all the extremely valuable southern species in the United States, where 25 species of *Swertia* are widely distributed.

White (L. T.). **Studies of Canadian Thelephoraceae. VIII. Corticium galactinum (Fr.) Burt.**—*Canad. J. Bot.*, 29, 3, pp. 279–296, 2 pl., 7 figs., 1951. [Received 1952.]

In a further study in this series [cf. *R.A.M.*, 30, p. 498] the author gives the history, taxonomy, and geographical distribution of *Corticium galactinum* [ibid., 31, p. 52] causing root and butt rot of living conifers and broad-leaved trees in various localities in Canada and the United States, including British Columbia,

New Hampshire, Vermont, New York, Connecticut, Michigan, Washington, South Carolina, Florida, and California, as well as in Czechoslovakia, Poland, and Finland.

C. odoratum, which occurs on pine and other conifers and hardwoods in Ontario, Czechoslovakia, and Sweden, resembles *C. galactinum* in most respects, possessing similar gloeocystidia and flexuous basidia, but differs in having larger spores averaging about 8 by 5 μ and hyphae with a closer dendritic type of branching. The clamp-connexions, which are regularly present in the thin-walled hyphae and at the bases of the basidia in *C. galactinum*, are lacking in *C. odoratum*. The gloeocystidia in the latter are much less abundant and conspicuous.

The results of interfertility studies in which single spore cultures obtained from fruiting bodies of *C. galactinum* during summer and autumn, 1948, were paired in all possible combinations, indicated that this species exhibits a tetrapolar heterothallism. The presence of false clamp-connexions seems to depend on the assortment of both factorial pairs, i.e. they were formed when factors (*A*) (*a*) were present in a heterozygous and (*B*) (*b*) in a homozygous condition. In all cases pairings of the four mating types of mycelia from one fruit body with the four similarly constituted mycelia from a second produced clamp-connexions, indicating the presence of multiple allelomorphs for fertility.

HARMSEN (L.). **Merulius tignicola sp. nov. og dens forekomst i Danmark.** [*Merulius tignicola* n.sp. and its occurrence in Denmark.]—*Friesia*, 4, 4, pp. 243–256, 12 figs., 1 graph, 1 map, 1952. [English summary.]

Merulius tignicola n.sp., isolated at the Technological Institute, Copenhagen, from some 200 samples of wood affected with dry rot from Danish buildings, is characterized by fruit bodies resembling those of *M. lacrymans*, but thinner, and the smooth, yellow, broadly ovate, often unilaterally applanate basidiospores are smaller, measuring 5 to 6 by 4 μ. The mycelial strands are composed of thin-walled and vasiform hyphae, the former 2 to 3 and the latter 10 to 15 μ in diameter. There are no thick-walled fibre hyphae such as occur in *M. lacrymans*. *M. minor* [*R.A.M.*, 22, p. 49], a nomen nudum and nomen ambiguum (dubium) [ibid., 28, p. 642], may refer to a fungus identical with *M. tignicola*.

The white, somewhat irregular mycelium of *M. tignicola* grows slowly in culture, extending by 1 to 1·5 mm. daily compared with 5 mm. for *M. lacrymans*; the hyaline hyphae, 3 to 5 μ, form numerous clamp-connexions. A persistently high moisture content is requisite for the growth of the fungus, which caused 41 per cent. loss of weight in spruce over a ten-month period. The invaded wood turns brown, crumbles, and develops longitudinal and transverse fissures. It is found mostly on joists and boards of conifer wood, only one specimen of oak having been received, and is widespread throughout the country.

BECKER (G.) & WIEDERHOLT (W.). **Fluosilicathaltige Gemische für den Holzschutz mit herabgesetzter eisenschädigender Wirkung.** [Fluosilicate-containing mixtures for timber preservation with a reduced corrosive action on iron.]—*Holz a. Roh- u. Werkst.*, 9, 11, pp. 409–416, 3 graphs, 1951.

At the Material Testing Centre, Berlin-Dahlem, the authors found that a mixture of fluosilicic acid and alkali monofluoride in equal parts, or of fluosilicic acid, zinc fluosilicate, and alkali monofluoride in approximately equal parts, resulted in significantly less corrosion of iron fastenings than did fluosilicates alone [*R.A.M.*, 30, p. 441]. The mixtures do not penetrate wood as rapidly as ammonium fluoride alone but more easily than zinc fluosilicate by itself; however, after several weeks' storage at 70 to 90 per cent. relative humidity the depth of penetration was about twice that attained by zinc fluosilicate. At a dosage of 1·5 kg. per cu. m. wood the fluoride-fluosilicate mixtures confer protection against [unspecified] fungi.

Leopold (B.). **Studies on lignin. Part VIII. Nitrobenzene oxidation and sulphonation of wood decayed by brown-rotting fungi.**—*Svensk kem. Tidskr.*, 63, 11, pp. 260–271, 8 graphs, 1951.

At the Organic Chemistry Institute, Stockholm, the products obtained from spruce wood decayed by the brown rot fungi *Coniophora puteana*, *Merulius lacrymans*, *Lentinus lepideus*, and *Lenzites sepiaria* [*R.A.M.*, 31, p. 414] were studied by means of nitrobenzene oxidation and sulphonation.

The same oxidation products are formed as from fresh wood in roughly comparable proportions, but the yields based on lignin [see next abstracts] decrease progressively with the advance of decay. The portions of lignin extractable with ethanol-benzene and alkali give higher yields of vanillin than the remainder. The rotted wood is sulphonated fairly rapidly, even in neutral media, with almost complete delignification. The bulk of the sulphonic acids formed are not unlike those obtained from fresh wood, but some fractions differ appreciably, being extensively demethylated though showing no 'abnormal' phenolic hydroxyl content. The formation of carboxyl groups is indicated by a high oxygen content and a high barium to sulphur ratio.

The decrease in the yield of vanillin from decayed wood is attributed to a preferential attack by the fungi on the 'open' elements of the lignin.

Brauns (F. E.). **Chemistry of lignin.**—xv+808 pp., 13 figs., 15 diags., 11 graphs, New York, Academic Press Inc., 1952. £5. 16*s*. 0*d*.

Included in this treatise on the chemistry of lignin, interest in which is stated to be greatly increasing in American scientific and industrial circles, is a chapter (XXIII), with a comprehensive bibliography, on its biological decomposition, e.g., by wood-destroying fungi.

Nord (F. F.) & de Stevens (G.). **Studies on lignin and lignification.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 14, 2, pp. 97–102, 1951.

This is a summary and discussion, supplemented by references to the literature, of the authors' studies at Fordham University, New York, on the chemistry of lignin and its bio-synthesis, in the course of which they explain the role of wood-destroying fungi, *Trametes cinnabarina*, *Lentinus lepideus*, *Poria vaillantii*, *Lenzites sepiaria*, and *Daedalea quercina*, in its decomposition [*R.A.M.*, 30, p. 254].

Chattopadhyaya (S. B.). **Control of post-emergence damping off of vegetable seedlings.**—*Sci. & Cult.*, 17, 1, pp. 37–38, 1951. [Received August, 1952.]

Laboratory experiments were conducted at the State Agricultural Research Institute, Tollygunj, Calcutta, to test the efficiency of mercuric chloride for the control of post-emergence damping off, using soil inoculated with *Pythium aphanidermatum* [*R.A.M.*, 29, p. 341; 30, p. 256; 31, p. 492] and various vegetable seedlings. Mercuric chloride had generally given good control during the preceding three years. Soil sterilization and one application of mercuric chloride solution (1:1,500 parts of water) both gave good control, the number of surviving seedlings (out of 20; average of six tests) for the two treatments, respectively, being 7·2 and 10·2 for Patnar cauliflower (two applications of fungicide) and 14·1 and 15·8 for Benaras, compared with 4·8 and 12·8 for the untreated; for Early Market tomatoes the corresponding figures were 13·2 and 12·4 (8·4 untreated). For cabbage the highest survival rate was 8·4 out of 20.

Roland (G.). **Sur une maladie à virus du Cresson (Nasturtium officinale).** [On a virus disease of Watercress (*Nasturtium officinale*).]—*Parasitica*, 8, 1, pp. 1–3, 1 fig., 1952.

On 4th October, 1950, watercress growing at Jemeppe-sur-Sambre, Belgium,

developed a yellow mosaic on the leaves, sometimes in the form of small rings. On 13th November, only the oldest leaves bore symptoms, which reappeared on the young leaves on 11th January, 1951; later, all the leaves became affected and the oldest yellowed prematurely. When individuals of *Myzus persicae* taken from affected plants were placed on five healthy watercress plants, yellow vein-clearing developed on the young leaves of two plants one month later, some leaves having a mosaic pattern with a tendency to form small rings. Later, both plants developed a conspicuous mosaic. The disease was not transmitted by sap inoculation to tobacco, cucumber, *Nicotiana glutinosa*, *Datura stramonium*, or chilli, but was so transmitted to watercress. Further transmission tests with *M. persicae* showed the virus to be persistent. As the virus differs from all others recorded on watercress the author concludes that it is new and names it *Nasturtium* virus 1.

Hurtig (Ingeborg). **Gefässversuche mit Kohlhernie anfälligen und resistenten Cruziferen.** [Pot experiments with crucifers susceptible and resistant to club root.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 6, 1, pp. 10–14, 6 figs., 1952.

In experiments at the Institute of Phytopathology and Plant Protection, University of Göttingen, Germany, to determine the correlation between lime content [*R.A.M.*, 3, p. 620; 13, p. 140] and the incidence of club root of crucifers (*Plasmodiophora brassicae*) [ibid., 31, p. 158] in pots each containing 7 kg. infested soil, infection mostly reached a maximum at half saturation of the hydrolytic acidity (5·15 gm. calcium oxide) and in a few instances even at full saturation and double this amount (10·3 and 20·6 gm., respectively). At 41·2 gm., however, the development of the pathogen was virtually arrested. Mustard (*Sinapis arvensis* and *S. alba*), rape, turnip, and swede were the most susceptible of the species tested, *Camelina sativa*, *Capsella bursa-pastoris*, and cress (*Lepidium sativum*) [ibid., 29, p. 247] showing considerable resistance at double strength, while *Raphanus raphanistrum* was practically resistant at all degrees of acidity.

Gassner (G.). **Zur Frage der Übertragung von Cercospora beticola durch das Rübensaatgut.** [A contribution to the question of the transmission of *Cercospora beticola* through Beet seed.]—*Angew. Bot.*, 26, 2, pp. 55–59, 1 fig., 2 diags., 1952.

Beet leaf spot (*Cercospora beticola*) [*R.A.M.*, 30, p. 9] is virtually non-existent in the dry climate of the Anatolian plateau (700 to 800 m. above sea-level) in Turkey, whereas annual epiphytotics are promoted by the warm, damp conditions prevailing in the low-lying regions of Adapazar and Alpullu [ibid., 31, p. 364]. After a severe outbreak in the summer of 1936, when the new foliage was successively destroyed by the pathogen, experiments were undertaken to elucidate the cognate problems of seed transmissibility and seed treatment.

Diseased seed was found to contain an abundance of conidiophores and conidia of *C. beticola*. In the winter of 1936–7 when seed clusters of this type were germinated on *Chenopodium* agar at 25° C., the fungus developed profusely in the diseased material after six days and continued to increase during the next ten. In further tests on the infected material, some lots were left untreated while others were dusted with ceresan, abavit U, or betanal [ibid., 25, p. 26] at a dosage of 800 gm. per 100 kg. After 14 days on *Chenopodium* agar at 25° the percentages of infection in the untreated and dusted lots (in the order given) were 97, 1, 3, and 92, respectively.

These results are considered to leave no doubt as to the possibility of leaf spot transmission through the seed [ibid., 7, p. 694; 11, p. 348]. Field experiments were carried out in 1937 on the Anatolian plateau and at Adapazar on plots where beet had not been grown for five years and surrounded on all sides by barriers of summer barley 12 m. wide to obviate secondary infection. As usual, no leaf spot developed on the plateau, but at Adapazar the first symptoms appeared at the beginning of

June in plots sown with infected seed and by the middle of the month the healthy ones were also involved. At the beginning of July the percentages in the two series were 71 and 38·3, respectively, but as time went on the differences became less noticeable and by the late summer they were no longer perceptible.

In other tests (replicated sixfold) on the plateau and in a low-lying region treated and untreated seed were compared, barley barriers being used as before. The seed was sown on 3rd March, 1937, and by the end of May leaf spot had developed to a limited extent in the untreated plots of the low-lying region, the plateau again being entirely free. On 14th June the percentages of infection in the control plots and in those dusted with ceresan and abavit U were 47·2, 27·1, and 26·7, respectively, but during the ensuing weeks the differences were obliterated, showing that seed treatment, like the use of healthy seed, confers only temporary and limited protection. On the basis of practical experience the author advises the discontinuance of further attempts to forestall leaf spot epiphytotics by the prevention of seed transmission, since the abundance of infective material provided by diseased beets and refuse left in the field after harvesting precludes the limitation of outbreaks by such means.

Cruickshank (I. A. M.). **Pea-wilt in New Zealand.**—*N.Z.J. Sci. Tech.*, Sect. A, 33, 4, pp. 75–80, 3 figs., 1951.

Glasshouse and field soil-inoculation experiments carried out in New Zealand demonstrated that the Delwiche Commando, Giant Alderman, Quartermaster, Giant Stride, Yorkshire Hero, Senator, English Wonder, Stratagem, and Laxton's Progress garden varieties of pea and the Marathon, Harrison's Glory, Blue Prussian, and Mammoth White field varieties were resistant to wilt (*Fusarium orthoceras* var. *pisi*) [cf. *R.A.M.*, 25, p. 431; 30, p. 361].

Wallen (V. R.) & Skolko (A. J.). **Activity of antibiotics against Ascochyta pisi.**—*Canad. J. Bot.*, 29, 4, pp. 316–323, 1951. [Received 1952.]

At the Central Laboratory of the Division of Botany and Plant Pathology, Ottawa, several antibiotic substances reported to possess antifungal properties were tested at various dilutions for their activity against spores of *Ascochyta pisi* [cf. *R.A.M.*, 30, p. 425]. Antibiotic XG [loc. cit.], actidione [ibid., 31, p. 344], and viridin (pH 3·5) [produced by *Trichoderma viride*: ibid., 29, p. 322; 31, p. 238] were fungistatic at dilutions of 10 p.p.m., and gliotoxin [ibid., 29, p. 524] and gladiolic acid [loc. cit.] at 20 p.p.m. Antibiotic XG, gliotoxin, actidione, humulon (from hop: *Arch. Biochem.*, 19, p. 199, 1948), gladiolic acid, and viridin were all fungicidal at concentrations of 50 p.p.m. after exposure for 12 hours; clavacin, lupulon [loc. cit.], and citronin, however, required concentrations of 100 p.p.m.

Studies on the effect of the antibiotics on the germination of disease-free Valley pea seed on filter paper and upon emergence in soil indicated that, in general, those which were the most fungitoxic were also the most phytotoxic. In the filter paper test actidione and XG were phytotoxic at 1 p.p.m., viridin, lupulon, humulon, gladiolic acid, and gliotoxin at 5 p.p.m., and clavacin and citronin at 15 p.p.m. In the soil test the emergence of seed treated for six hours at all concentrations up to 50 p.p.m. compared favourably with the untreated; emergence was lowered with 12 hours' steeping, especially with XG and to a lesser extent with viridin and humulon; and with 24 hours' soaking emergence was considerably reduced by all the antibiotics. When naturally infected Lincoln pea seed was treated by soaking in the antibiotic solutions, only XG and actidione gave adequate control. The latter, however, seriously reduced germination.

It is concluded that although actidione and antibiotic XG were the most promising on the basis of these tests, gladiolic acid and viridin might be used successfully to control other seed-borne diseases where infection is more superficial.